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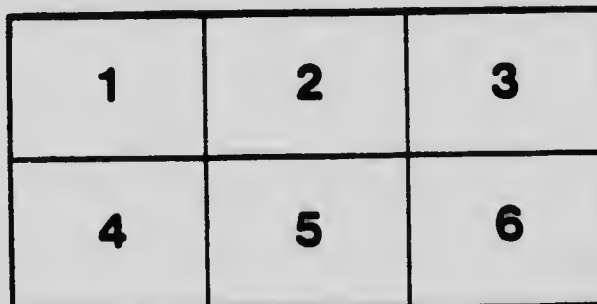
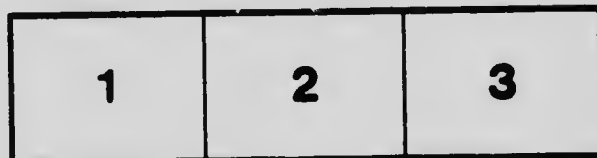
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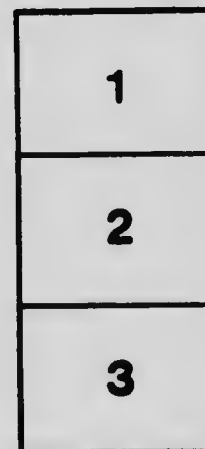
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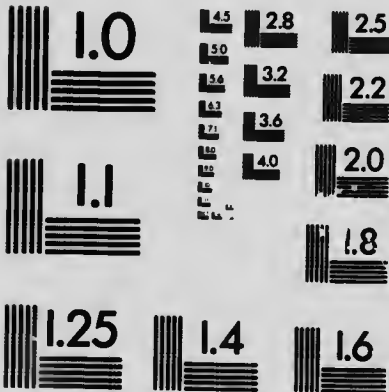
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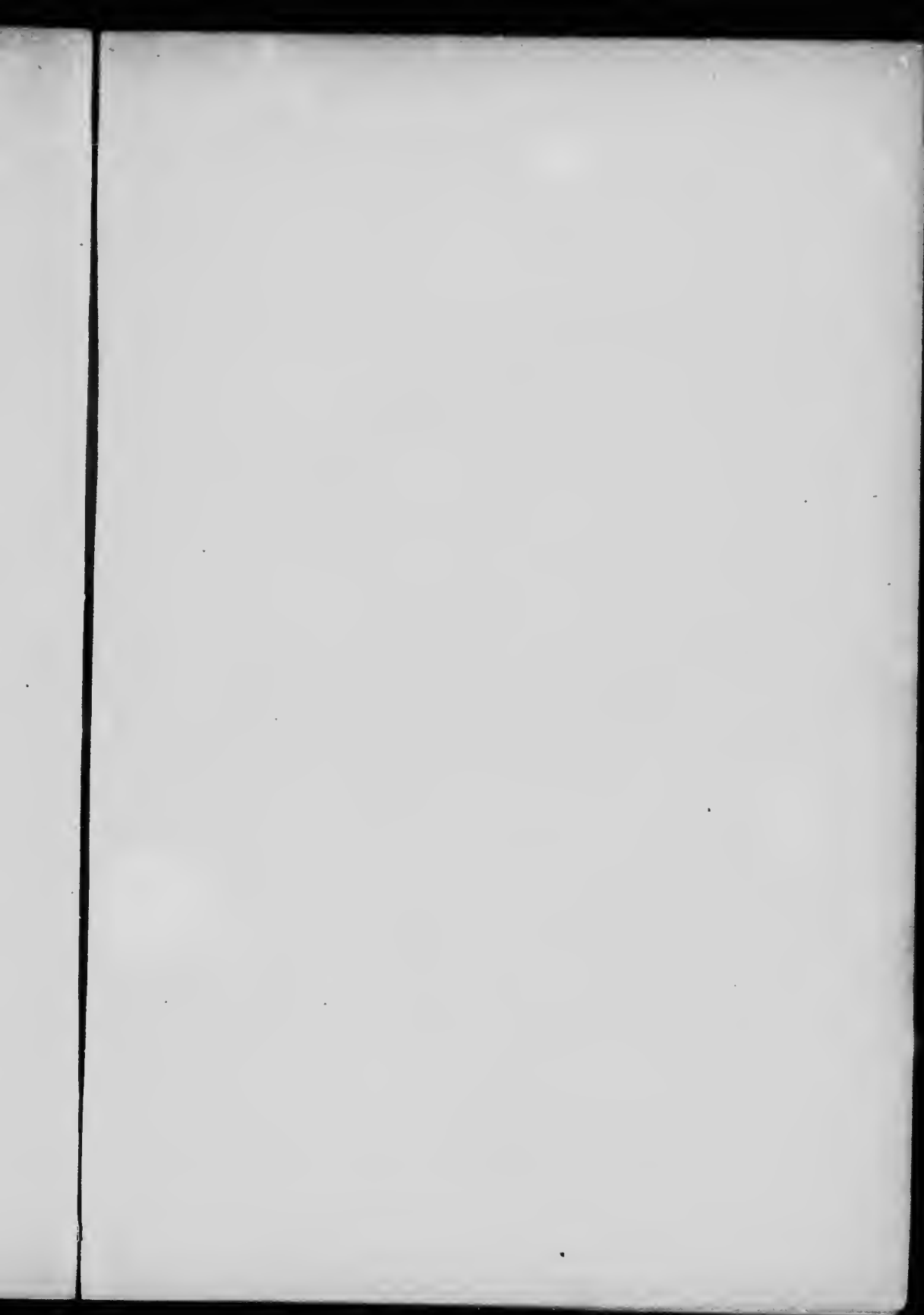
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To which is added an article by

J. G. RUTHERFORD, Chief Veterinary Inspector.

ON

The Breeding in Canada of Horses
for Army Use.

ILLUSTRATED.

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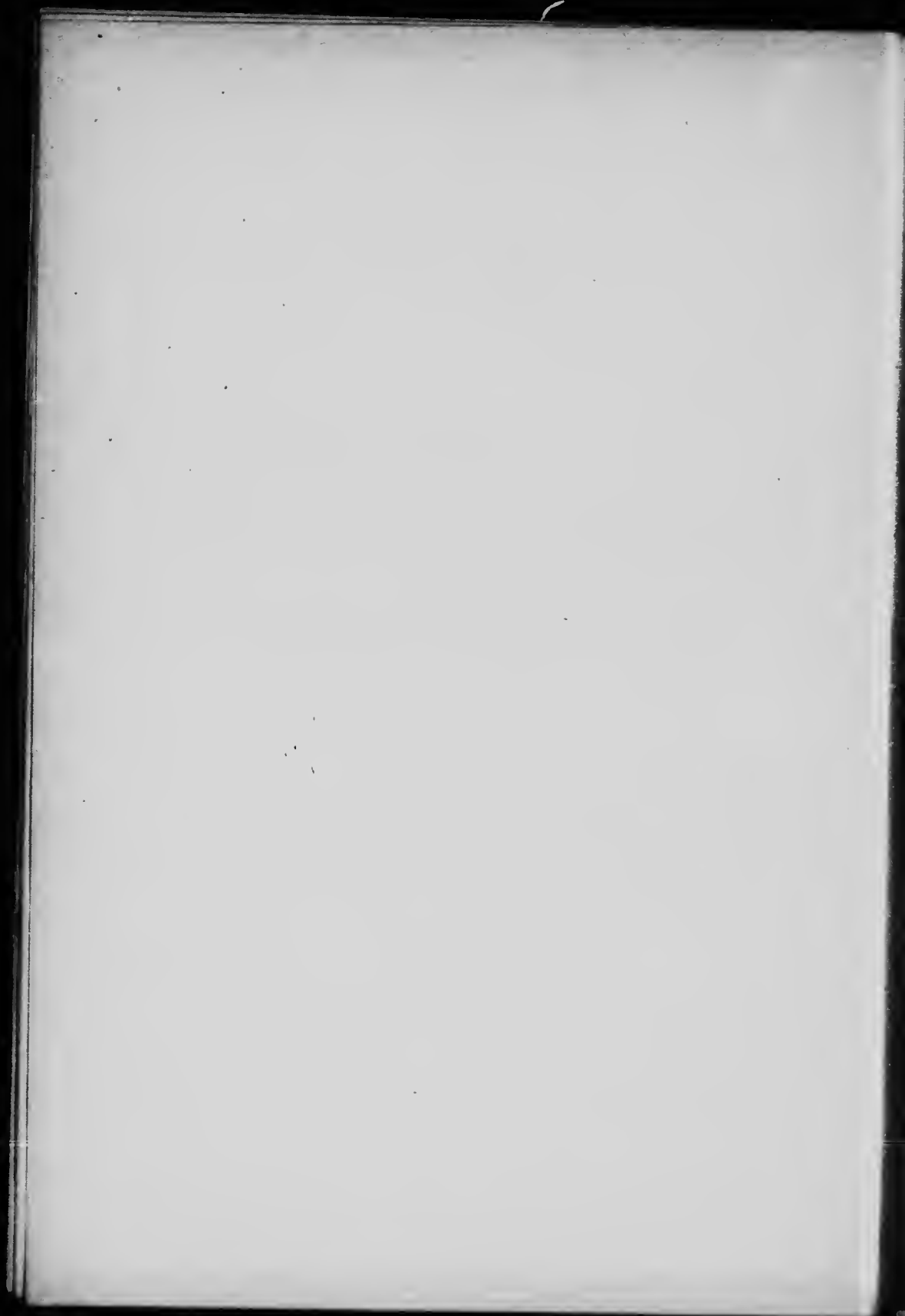
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The Breeding in Canada

OF

Horses for Army Use.

While the supply of horses suitable for military use has always, even in times of peace, been a serious question, the experience of our South African troubles has given it an importance altogether new and somewhat startling. It has now been clearly shown that troops under modern conditions of warfare must be able to move rapidly from place to place, and that the mounted soldier has thus an immense advantage over the less mobile infantry man.

This development has led to the purchase by the British Government, during the recent campaign, of a very much larger number of horses than would otherwise have been required. Nor has the lesson been learned by Britain alone; all military nations have been closely watching the operations in South Africa, and there is no room for doubt that the general demand for horses suitable for army purposes will be much greater in the future than in the past. Of the horses purchased for use in Africa the Dominion has by no means furnished her fair share, although in addition to those taken by our contingents, a considerable number have been picked up in Eastern Canada by Lt.-Col. Dent of the Remount Department of the British Army. It is, however, an easy matter at present to obtain in this country any large number of horses altogether suitable for army use. No encouragement to produce them has, until very recently, been shown to breeders, and there being no very active home demand for any but the vest best of the sorts now asked for, they have not been bred to anything like the extent of which the country is capable. After the visit of Colonel Ravenhill in 1887, the western ranchers, in



GENERAL.

expectation of a market, went to much trouble and expense in securing and importing suitable foundation stock, and as a result were successful in producing many first-class cavalry horses. As however, beyond a limited number taken by the North-West Mounted Police and a few by foreign buyers, there was no sale for them as such, the breeders have largely turned their attention to other, and, under the circumstances, more profitable lines of stock.

The natural conditions in Canada are, it need hardly be said, most favourable for the production of the animals wanted, while in the event of serious international disturbance Canadian horses would always be available for Imperial use, while it might be impossible to procure them in foreign countries. Again, through the medium of our great trans-continental railway they could be shipped from either Atlantic or Pacific ports to any part of the world where they might be required.

In view of the strong possibility that the demand hitherto lacking will in the future be such as to warrant the breeding in fair numbers of the horses needed for military use, a brief description of those sought for and purchased by the agents of the British war office, and a few hints as to how they may be produced, will not be out of place.

They are of three fairly distinct types as required for artillery, cavalry and mounted infantry.

At the Canadian horse show held in Toronto in April, 1900, the Dominion Government gave special prizes for each of these classes, and as Lt.-Col. Dent, the Imperial remount officer detailed to purchase in Canada, was one of the judges, thus making the selections authoritative, a description of each first prize animal, together with its measurements, will be appended to the general list of requirements in all three divisions.

THE ARTILLERY HORSE.

The artillery horse asked for by the army buyer is really a smart, active van or express horse on short legs, with plenty of bone and substance and enough quality to



HERO.

insure staying power in fairly fast work. He should stand from 15.2 to 16 hands, weigh not less than 1,300 lbs., and measure at least 8 inches below the knee and 72 inches in girth. Considerable variation in type is permissible, the work of the horse artillery demanding greater speed and therefore more warm blood than are necessary for ordinary field artillery, while in all batteries properly horsed, the head and centre pairs are slightly taller and more rangy than the wheelers, the latter requiring greater strength and substance. The first prize entry at Toronto was of the lighter sort, being in fact the pure-bred Hackney mare 'Cassandra.' She stood 16 hands, weighed 1,325 lbs. and girthed 76 inches. She measured $8\frac{1}{4}$ inches below the knee and $20\frac{1}{4}$ inches round the arm; from crest to withers 36 inches, withers to croup 29 inches, croup to tail, an important point in all military horses, 19 inches. Although in this particular instance the prize went to a Hackney, it does not, by any means, follow that gun horses should be either wholly or partly of that breed. They may be obtained by the judicious use of the Thoroughbred horse on mares of size, substance and action, or by stinging good half-breed or strong roadster mares to a biggish Hackney or breedy coach mare. So long as they show sufficient quality to ensure activity and endurance and at the same time meet the requirements as to size and substance, the question of pedigree is of secondary importance.

THE CAVALRY HORSE.

The cavalry horse is of a somewhat different type, and one at present too rare in Canada, owing to the preference shown by many light horse breeders for the American trotting sire, an animal possessing but few of the qualities and characteristics of the riding horse.

Colonel Ravenhill in his report says:—'A malformation in the Canadian horses which might advantageously be brought to the notice of breeders is that their quarters are short and very drooping, a serious defect in a military horse. Indeed we had to reject as unsuitable a considerable proportion on this account; this is not only a

great dissight, but where a mounted soldier has to carry a kit on his horse's back it amounts to an insuperable objection; it has arisen from the too extensive use of the American trotter for stud purposes, this defect being very apparent in that horse. This is an additional reason for the more continuous introduction of the English Thoroughbred, or such horses which are very straight in their backs and quarters with tail set on high.'

To get good cavalry horses the Thoroughbred sire is almost indispensable, as in no other way can the lengthy rein, sloping shoulder, deep chest, strong loin and long quarter so necessary in this class, be obtained with any certainty or regularity. Freedom of movement is essential, but high action and great trotting speed are neither required nor wanted. Horses of this class should stand not less than 15.1 nor more than 15.2, and should measure at least 8 inches below the knee and 70 inches in girth.

The first prize at Toronto was taken by a brown gelding named 'General,' said to be by a Thoroughbred horse. He was a remarkably well proportioned weight-carrier of considerable length and great substance. His measurements were as follows:—height 15.3, cannon bone 8 inches, arm 21 inches, crest to withers 37 inches, withers to croup 33 inches, croup to tail 15 inches, girth 74 inches.

Horses of this stamp can best be procured by the use of selected Thoroughbred sires on strong half-bred mares, on the better class of roadster mares, or on mares from Hackney or Coach sires, provided they show some blood and quality. On mares having a preponderance of warm blood or those showing any inclination to weedi-ness, a good Hackney horse might be advantageously used.

THE MOUNTED INFANTRY HORSE.

The mounted infantry horse, for which such an unprecedented demand has recently arisen and which is likely to be even more sought after if present war conditions continue to prevail, is a smaller and cheaper ani-



CASSANDRA.

mal than either of those already described. He is in fact a cob, a strong pony on short legs, with as much quality as can consistently be looked for in conjunction with the substance required to carry an armed man. He must have a fair shoulder and a good back, be deep through the heart and stand squarely on good legs well furnished with bone. In height he may be from 14.1 to 15.1, but 14.3 is the favorite standard with Lt.-Col. Dent. Strength is the great desideratum, but a reasonable amount of activity is indispensable.

The little horse 'Hero' which took first prize in Toronto, stood 15.1, measured $7\frac{3}{4}$ inches below the knee and $19\frac{1}{2}$ inches round the arm; from crest to withers he was 34 inches, withers to croup 27 inches, croup to tail 15 inches. He girthed 73 inches, and as the measurements show, was an excellent type of the weight-carrying cob. Such horses can be obtained by a stout Thoroughbred sire from French Canadian or other strong pony mares, or by the judicious use of the Hackney horse or the smaller roadsters and on those little mares too common in Canada, resulting from the ill-advised use of the racing or rather sprinting type of Thoroughbred on light mares of trotting blood or other mixed breeding.

GENERAL REQUIREMENTS.

In times of peace no horses are bought at less than four nor more than seven years old.

As regards colour, bays, browns, chestnuts and blacks are preferred; a few grays are required for special corps, but odd coloured horses are not wanted.

No unsound or seriously blemished horse will be taken; the veterinary examination is fairly strict but is also strictly fair. Un-docked horses are preferred and no horse with a very short docked tail will be taken.

In time of war, however, when the demand, as a rule, exceeds the available supply, purchasing officers overlook many minor defects, provided the animals offered are sound and serviceable, while conforming generally to the requirements of the service.

ADVICE TO BREEDERS.

Breeders on the Western ranges will, no doubt, find it profitable from this time forward to devote considerable attention to the production of horses especially adapted for military use.

In the other portions of the Dominion the supply of such horses can be enormously increased with but little extra effort or expense on the part of the breeder.

Immense numbers of light horses and ponies are annually bred in Canada, of which many, when grown, are, owing to their nondescript character, of but little value. If the breeders of these animals would send their lighter mares to pure bred stallions, of the British breeds, intelligently selected with a view to the production of a definite type of military horse, a vast improvement in our clean-legged stock would speedily manifest itself.

High prices would then as now be easily obtainable for really superior animals; most of the others would find ready sale for army use as well as for other purposes, while the misfits and other object lessons would be less numerous, and, except by comparison, not less valuable than they are at present.

J. G. RUTHERFORD.

THE FARMER'S VETERINARY ADVISER.

CHAPTER I.

History of the Horse. Different Varieties. Management and Feeding. Principles of Breeding. Medical Treatment. Age. Shoeing. The Points of a Horse, and how to Judge Him. Speed, Strength, Beauty and Endurance. General Remarks. Twelve Points of a good Horse.

ISTORY OF THE HORSE

The oldest and best authenticated accounts of the first appearance of the horse we obtain from the sacred volume, where we find him early among the Egyptians, and at the time of Joseph composing largely the strength of the Egyptian army.

Though we find the horse through the bible, thus early, and with the advanced civilization of that time, the native country of the horse has not with certainty been traced.

It is through the bible also that we learn that the horse was first domesticated about 1740 B. C., and that from Egypt his use rapidly spread to the various countries.

The Arabian horse was not heard of until some six or eight hundred years after, and was undoubtedly derived from Egypt, but it was as late as the seventh century before the Arabian horse had been brought to that degree of perfection which is the beau ideal of a horse, and for which the Arabian steed is so justly celebrated.

The horse has been found varying materially in form, in size, and in utility in all the temperate, in most of the sultry and in many of the northern regions of the Old

World. He is also found wild ranging the Pampas of South America and the New World, and on the plains of Tartary.

These herds are all clearly descendants of those which have escaped from the slavery of man.

Those of South America being the numerous progeny of a few horses left by the Spaniards during their early expeditions.

The troops of wild horses in South America have been described by travelers as immense, and one writer affirms to have seen as many as ten thousand in one herd. Each herd is headed by a leader, who appears to be the noblest and most courageous of the flock and whom they implicitly obey, "His head clothed with thunder" and "the glory of his nostrils is terrible."

It is sometimes dangerous to fall in with these troops of wild horses, as it is with the utmost difficulty that your horse is restrained from answering to their frantic calls, by a leap for liberty.

It has already been stated that the earliest records we have of the horse trace him to Egypt, from whence he gradually found his way to Arabia and Persia, and thence to the other parts of the Old World. Therefore in giving a brief account of the various breeds most useful to man at the present time, we will begin with those of Egypt, and describe only those which have contributed to the excellence of the English and American breeds.

The varieties of the domesticated horse are the Barb, Dongola, Arabian, East India, Chinese, Persian, Toorkoman, Tartar, Turkish, German, Swedish and Norwegian, Iceland, Flemish, French, Spanish, Italian, English and American.

THE DONGOLIAN is described by Bessman as being the most perfect and beautiful in the world, being most beautifully symmetrical in their parts, nervous and elastic in their movements, and docile and affectionate in their manner.

THE BARB from Barberrry is remarkable for his fine and graceful actions. Is about 14 hands 1 inch high.

and has a remarkably beautiful head and chest. The Barb has contributed to the excellence of the English horse. The celebrated Godolphin Arabian was a Barb. The Barb gave to the Spanish horse its excellence.

THE ARABIAN.—The type of beauty, spirit, grace, and docility we will speak of at some length as furnishing a model for our readers, while we simply mention the others sufficiently to instruct them regarding their varieties or breeds. He stands about 14 hands 2 inches high.

There are reported to be three varieties, viz.:

The Kochlani horse or pure breed, Attachi or inferior breed, the Kadischi or mixed breed, whose genealogy the Arabian pretends to trace back 2,000 years. A most careful account is now kept of these genealogies, and with true oriental exaggeration are even traced back to the stud of Solomon.

The Kochlani are principally reared by the Bedouin Arabs in the remoter deserts. A stallion may be procured with little difficulty on the payment of a large price, but it is next to an impossibility to purchase or obtain a mare, so highly are they valued and prized by the Arab.

The genealogy of the Arabian horse is always traced from the mother, as the Arab believes that the mare is more concerned in influencing the excellence of the foal than the stallion.

The Arabian horse is celebrated for his perfect and inimitable head. The broadness and fullness of his forehead, the shortness and fineness of the muzzle, the prominence and brilliancy of his eyes, the smallness of his ears, and the beautiful tracery of the veins. His body may be light and his chest narrow, but the barrel swells out grandly behind the arms and give sufficient play for the lungs.

The shoulders are superb. The withers high and the shoulder blade oblique or inclined backward and so nicely adjusted that in descending a hill, the point or edge of the hame never ruffles the skin. The legs, fine, flat and wiry, while the muscular development is per

fect. He is gentle, docile, even-tempered, intelligent, courageous and speedy. He presents the true combination for speed and bottom, strength and courage. The horse is treated from a foal with the utmost consideration and kindness, made the companion of the children, all of which has had the happiest effect upon his disposition and temper. The Arab who thus lives with and loves his horses, and regards them as the most priceless jewels of his possessions, yet puts the young horse to a severe trial, in order to establish his reputation. "Probably the filly has never before been mounted; she is led out; her owner springs on her back and goads her over the sand and rocks of the Desert at full speed for fifty or sixty miles without one moment's respite. She is then forced, steaming and panting into water deep enough for her to swim. If, immediately after this she will eat as if nothing had happened, her character is established and she is acknowledged to be a genuine descendant of the Kochlani breed. The Arab is not conscious of the cruelty he inflicts. It is an invariable custom, and custom will induce us to inflict many a pang on those whom, after all, we love."

THE EAST INDIAN is a beautiful and graceful animal.

THE CHINESE HORSE is weak, ill formed and without spirit.

THE PERSIAN HORSE is next in rank to the Arabian, and possessing many similar points.

THE TOORKOMAN HORSE is large, 16 hands high capable of immense endurance with great speed, yet lacking a graceful action and form.

THE TARTAR AND CALMUCK HORSES resemble the wild horse of America, being more vicious.

THE TURKISH HORSE is a beautiful animal descended from the Arabian horse, and has contributed some to the improvement of the English breeds. The Byerley and Helmsley Turk are samples.

THE GERMAN HORSE is slow and heavy.

THE SWEDISH, FINLAND AND NORWEGIAN HORSES are small, yet beautiful, and remarkable for their speed and spirit.

THE ICELAND HORSE is small, strong and swift. There are numerous herds of these horses in Iceland descended from the Norwegian horse.

THE FLEMISH AND DUTCH HORSES are large, strong and beautiful, and have largely contributed to the excellence of the English Draught Horse.

THE FRENCH HORSE is a stocky, well made animal, but inferior to the English, though he has contributed to the improvement of the English breeds. Lately considerable attention has been paid to their cultivation, and France is now well supplied with excellent horses for the road, the carriage or military service.

THE SPANISH HORSE is celebrated for his beauty and spirit. The Wild horse of America is his descendant.

THE ITALIAN HORSE, once celebrated, has deteriorated, like everything else in that sadly mismanaged country, though some fine horses are yet raised there.

OF THE ENGLISH HORSE much might be said of the varieties, were it in the scope of this treatise. He is a beautiful animal of Eastern extraction, and brought to his present perfection by the most assiduous cultivation. The English thorough-bred is noted for his great speed, splendid form and many noble qualities, but his training in some respects has been faulty, as in temper he is a perfect devil.

THE AMERICAN HORSE.—What a flood of remembrance comes up of the American trotter!

Their deeds are recorded among the annals of the world. Dexter and Goldsmith Maid, with a score of others, keeping bright and adding to the path of fame which their worthy predecessors illuminated with their own brilliant deeds.

The American horse is peculiarly an American institution, the genius of which is to bring out that which is

most useful. Therefore we find the American horse unequaled by any other horse on the globe, in all that makes an animal such truly valuable in every kind of service. What is sought for in this country is speed, strength, endurance, sagacity, beauty, gentleness and graceful motion. We want trotters not runners, and some of our best breeds of horses are unequaled as furnishing the best combinations for these various qualities.

The celebrated Morgan breed is an instance of this combination of qualities.

IN THE GENERAL MANAGEMENT OF THE HORSE, the common-sense principles which direct the daily management of the affairs of the family, should be brought to bear upon the care of the horse, especially as to food, air, light, exercise, &c.

AIR.—The horse should have in his stable a proper amount of pure air, admitted in such a way as not to constitute a draught. The common error is to exclude as much as possible every breath of air and to have the atmosphere of the stable hot, contaminated and unwholesome.

A stable should neither be too hot nor too cool. It is equally an improper habit to take the horse into a very warm stable from the cold air, or to keep him too warm indoors and to then subject him to the colder atmosphere out doors.

Putting the humanity of the thing out of the way, it is unnaturally absurd treatment, to thus subject the animal to catarrhs, rheumatism, and inflammation of the lungs. The stable should be roomy, and not less than 12 feet high, especially when the hay loft is directly overhead.

In ordinary stables, to keep the manger clean and sweet, quick lime, sparingly used, is of much benefit.

The stable should be kept clean, every portion of litter which has been wetted should be swept away, so that the air be not contaminated by the foul gases emanating from the rapidly decomposing urine, which are prejudicial to the health of the horse.

A sufficient quantity of litter should always remain in the stall for the horse to stand upon.

LIGHT.—Light is an important but neglected branch of stable management. It should not be too glaring, but admitted so as to make a softened half light when the stable is occupied by the horse. A plentiful supply of the sunshine at least once a day when the weather is favorable is highly beneficial to the general state of the stable. The stable should not be too dark, as the sudden changes from the dark of the stable to the brightness of the open air is injurious to the eye of the horse, being a frequent source of inflammation of the eyes, and starting habits.

GROOMING.—To the highly fed stable horse, this is a matter of much consequence. Good rubbing with the brush and curry-comb opens the pores of the skin, and circulates the blood to the surface and extremities of the animal.

No horse will carry a fine coat without either heat or dressing. Exercise or dressing effect the purpose, as the insensible perspiration is promoted and the healthy action produced arouses all the energies of the skin.

The curry-comb should at all times be lightly applied. With very sensitive horses its use may altogether be dispensed with, and even the brush need not be too hard. A hair cloth while it will seldom irritate and tease, will be almost sufficient with horses that have thin hair and have not been neglected.

Whoever would be convinced of the benefit of friction to the horse's skin and to the horse generally need only observe the effect produced by well hand-rubbing the legs of a tired horse. While every enlargement subsides and the painful stiffness disappears, and the legs attain their natural warmth and become fine, the horse is evidently and rapidly reviving; he attacks his food with appetite, and then quietly lies down to rest.

EXERCISE.—Exercise should be somewhat proportioned to the age of the horse. A young one requires

more than an old one. Nature has given to young animals a disposition to activity; but the exercise should not be violent.

It should be given in such a manner as to preserve the temper and promote the health of the animal, and therefore should be moderate, at least at the beginning and end of exercise. A rapid trot or gallop may be resorted to in the middle of the exercise, but the horse should be brought in cool. The owner should exercise a supervision of this part of the horse training, and if possible have it done within sight, and not trust to the management of boys.

FOOD.—In this country there is less general variation in the food of the horse than in Europe, where the beet, carrot, turnip and barley, wheat and beans compose a large part of his food. Therefore we will simply give what we believe to be fundamental principles in the direction of the food and keep of a horse.

The time of feeding should be as nearly as convenient at regular intervals, three times daily; and when it is likely the horse will be kept longer than usual from home, the nose bag should invariably be taken. The small stomach of a horse is emptied in a few hours, and if he is suffered to remain hungry much beyond his accustomed time he will afterward devour his food so voraciously as to distend his stomach and endanger an attack of staggers. The true origin of this disease is in the majority of cases, irregular feeding. When extra work is required from the animal the system of management is often injudicious; for a double feed is put before him and as soon as he has swallowed it, he is started. It would be far better to give him a double feed on the previous evening, which will be digested before he is wanted, and then he may set out in the morning after a very small portion of corn or perhaps only a little hay is given him. One of the most successful methods of enabling a horse to get well through a long journey is to give him only a little at a time when on the road and at night to give him a double allowance of corn and hay. In ordinary

management the horse should not be given more than he will eat clean.

Always give your horse soft water, and not too cold. Instinct or experience has made the horse conscious of this, for he will never drink hard and cold water, if he has access to soft water; he will leave the most transparent and pure water of the well for a river, although the water may be turbid and from the muddiest pool. Hard, cold water acts on the sensitive coat of the stomach injuriously, often giving gripes or colic. Water three times a day any way, but the better rule is never to let him get too dry. Where he has free access to water he requires less. Water should be given before meals at all times. The horse should always be rubbed down before feeding. Never let a horse stand over night without a good grooming.

PRINCIPLES OF BREEDING.—We begin by laying down this axiom, "that like will produce like;" that the progeny will inherit the qualities or mingled qualities of the parents. There is scarcely a disease that the parent is affected with that the foal will not inherit, or at least a predisposition to it. Peculiarity of form and constitution will be inherited. The excellence of the mare is as much a point of importance as the horse. Out of a sorry mare, let the horse be as perfect as he may, a good foal will rarely be produced. In selecting a mare for breeding there is considerable difficulty, as her qualities should necessarily be somewhat different from the horse. Her carcase should be long, to give room for the foetus, but there should be compactness of form with this, and not too much length of back or leg.

As to the shape of the stallion, it must depend upon that of the mare, and the kind of animal you desire to breed. The points of blood, health and disposition should be rigidly examined. It is of no little importance that the parents should be in full possession of their natural strength and powers. It is a common error that because a mare has once been good, she is fit for breeding when no longer capable of ordinary work.

Her shape and size may insure a good form, but the foal will be sure to inherit some of the worn-out constitution from which he sprung.

A mare is capable of breeding at three or four years of age. Some injudiciously commence at two years, before her form and strength are sufficiently developed. The mare comes into heat in the early spring. She is said to go in foal eleven months on an average. The stallion should be perfectly calm when brought to the mare. None of your tearing, plunging, vicious kind; while the mare should be prepared by previous heating by means of a gentle exercise. Other things being equal a good foal will be the result.

Moderate exercise only after time of covering is desirable. When nearly half the time of pregnancy is elapsed the mare should have a little better food. After foaling the mare should be turned into some well sheltered pasture and well fed. Nothing can be gained by starving the mare and foal at this period. It is the most important time in the life of the animal, and if from want of sustenance his growth be arrested, his puny form and want of endurance will ever afterwards testify to the error that has been committed. The care of the colt should be guided by patience and kindness. Breaking should commence at once, and the colt be familiarized from birth with the associations with which he will be connected through life.

The period at which castration should be performed depends much on the breed and form of the colt and the purposes for which he is destined.

For the common agricultural horse, the age of four or five months will be most advisable, or at least before he is weaned. Very few horses are lost when cut at that age. For the carriage or heavy draught, he should not be cut before he is a year old.

If not well developed, six months later is advisable.

Castration should be performed late in spring or early in fall, in order to avoid the heat and flies of the summer. The mode and operation is best left to the veterinary surgeon.



Four Years Old.



Five Years Old.



Six Years Old.



Seven Years Old.



Eight or Nine Years Old.

ILLUSTRATIONS SHOWING THE AGE OF A HORSE BY THE TEETH.

THE MEDICAL TREATMENT OF THE HORSE.—A large proportion of the diseases of the horse can be prevented by good care and treatment, as it is much easier to prevent disease than to cure it, and in most of the epidemic, and inflammatory diseases peculiar to his kind, if he has good care, nature will work itself out of the trouble without the aid of medicine. Robust health is the natural condition of the horse. Most of the lame and unsound horses are made so by unnecessary abuse.

THE AGE OF A HORSE.—Horses show their age plainly by their teeth until the age of eight or nine, when their teeth, having become matured, are worn so as to cause the disappearance of the last dark cavity. Their tushes are also full size. After the above age it is more guess work than a certainty. Their "nippers" gradually grow longer and more slim and approach each other from the upper and lower jaws and meet more slantingly. There is also a loss of firmness about the lips, causing them to hang down in extreme old age. Also the hollows over the eyes become deepened.

SHOEING.—The paring of the hoof should be done in such a way as to preserve the natural shape of the foot. The frog, which is the uniting of the crust of the hoof, and essential to the strength of the heel and the support of the foot, should not be cut away. The shoe should be of the proper size to fit the foot without much rasping of the outside of the hoof, and at the heel made a little wider than the foot, so that the crust will not grow out over the edge of the shoe too soon.

The shoe should be of even thickness. The surface for the crust of the hoof to rest upon should be smooth and the nails when driven turned quickly to the outside.

THE POINTS OF A HORSE.—We now come to consider the constitution and form of a horse, which decide his strength, speed, bottom, beauty and disposition, and to point out the most important points to be observed in judging of his capabilities and value, from his form and appearance.

Being satisfied of his soundness and age, the first thing of importance is his temperament and disposition.

By temperament we mean the constitution of the brain and nerve forces, which affect and modify the whole physical structure, and determine the quality of his bone and muscle, as it does in a great measure his form.

We will not speak separately of the nervous temperament, which is characterized by quickness of movement and delicacy of feeling, resulting from the development of the brain and nervous system, or of the bilious temperament, which gives large bones, overlaid with heavy muscle and fibrous tissue, or of the purely sanguine temperament, characterized by good digestion, large lungs, heart and blood vessels; it is a combination of these three temperaments that we want. Brain, muscle and blood—activity, strength and endurance.

The preponderance of either of these temperaments will help to decide his character, but the more perfect and highly developed he is in all of these the better. These are the qualities which indicate his inner life and constitution. To observe these we will examine first the—

HEAD.—A low and what is called a phlegmatic temperament, and (which may only be an absence of the others) will be seen by a dull inexpressive eye, a flat narrow forehead, and general flatness of feature everywhere, with movements awkward and stumbling. But on the contrary, if he has a highly organized nervous system, his head will be the glory of the whole structure. In his countenance will be expressed energy, fervor and vivacity, intelligence and courage; and, unless vicious, gentleness and amiability. The head should be of moderate size, the muzzle fine, the nose thin, enlarging suddenly, giving broadness and fullness between the eyes, and rounding out towards the ears, the part which contains the brain.

The eyes full and brilliant, eyelids fine and thin, without any wrinkles under the eyes or about the corners. Fine, wiry and compressed lips, sensitive to the bit and giving good depth to the mouth. The lips being the

hands of a horse to gather in his food, much is indicated by the fineness of their development.

The nostrils should be fine, large and dilatable. *Car-* says, "In conformity with the uniform condition of the Creator's works, there will be found to be a direct relation between the development of the nostrils and the capacity of the lungs." The ears should be thin, fine and pointed, not set far apart, quick, and having rather of an attentive and playful motion. It is a good sign to see him, when driven, occasionally moving one ear forward and the other back, showing that he is not listless, but attentive and "nervey." Much can be told of what is going on in the mind by the motion of the ears, as when meditating mischief he lays them back. Their constant motion in every direction will detect his blindness. The eyes, too, indicate his temper.

A horse that shows the white of his eye much is apt to be tricky, a sunken forehead, with ears far apart, indicate bad memory and bad temper. To observe a horse's head, first get a good front view; observe the distance between the ears, the length and curvature of the same, the space between them and the eyes, the eyes themselves, the cheek bones, the muzzle, the nostrils and lips; then step one side and scan the head in profile, observe the way it is joined to the neck, its balance and pose, the conformation of the joles, the nose line, the make-up of the lower jaw and lip; do all this before you have even given a glance at the body, for by the study of the shape of the head and the look of the face, beyond anything else, you will be able to decide as touching the temperament of the animal, which dominates for good or ill over the entire organization.

NECK.—The beauty of a horse depends much upon his style of neck. A difference in shape, length, thickness and adjustment of the neck materially changes the whole appearance of the animal, as well as indicates his service—a thick, heavy, muscular neck is considered by many a disadvantage for speed, as it loads down the fore parts, while it is an advantage to the draught horse.

The English thorough-bred race horses have slim necks, but for fast trotting I do not think a very slim neck has any advantage. It should be of good thickness at the shoulder, length and curvature enough to secure beauty and the graceful balancing of the body, and small where it joins the head. Some of our best American trotters have model necks, and a refutation of the idea that advantage in speed is gained by a neck too slim for the beauty and graceful appearance of the animal.

THE CHEST.—The chest or cavity which contains the heart, and lungs, the organs which have the function of circulating, vitalizing and purifying the blood, on which the growth, life and vigor of the whole organization depends, should be large. In animals, as well as in man, a large chest not only indicates great lung power but vigor and strength of constitution. In the draught horse his full breast and large round chest indicate his great strength and endurance, but as in most horses speed is an essential qualification, the shape of the chest becomes important as well as its size. It must not be so broad in front as to interfere with the fullest action of the shoulder, at the same time it must be large and have the capability of increasing its capacity, to accommodate the expansion of the lungs in extreme action, for speed is what tries the lungs of a horse and puts them to the severest tests.

This end is accomplished by increasing its depth. The chest should be deep like that of the greyhound. This deepening of the chest gives the cavity an oval shape. The construction and curvature of the ribs of a horse is such that when, from his rapid motion, his lungs become inflated the ribs are elevated on the sides by being bent a little so that the arch is carried directly outward instead of inclining back, and the capacity of the chest is increased as it assumes a more circular form; while on the contrary if it were round at first the more the ribs were arched the less would be its capacity. Therefore, a horse's "wind" depends greatly upon the depth of his chest. The length of the chest is also to be

taken into account, which is shown by the ribs extending back near the hips. Sufficient space, however, must be left for the full action of the hind-quarters according to his speed.

THE BACK.—The back should be short in proportion to the whole length of the horse below, from the point of the shoulder to the back part of the ham, whether you consider his speed as a trotter or his strength and power of endurance.

It may be thought by some that a long back will give length of stride, but we are convinced that length of stride depends much more upon the lower length, (viz.: from the point of shoulder to back of ham,) which being long in proportion to the length of the back indicates length and position in the shoulder blade, humerus and thigh bones. If we wanted horses only for running we should want light airy horses with perhaps long backs; but these are not the horses needed in this country, but horses with short strong backs; as Murray says: "We want strength in the back and loins, to deliver their strokes in a straight line," which tell; "to catch quick and handily when they break," "long stride but quick recovery;" "not these long striders that leave their legs long under the sulky;" and "that a short back is a sure evidence that the horse will pull a heavy load a great distance and not tire; nor will he break down easily under fast driving."

The strength of the back also depends much upon the height of the withers and breadth of the loins, which is regulated by the dorsal vertebræ over the shoulder and by the six lumbar vertebræ and hip bone, which afford large surface for the attachment of the strong muscle which extends from the neck over the whole length of the back and loins.

This muscle is a very important one as well as others of the side and back and should be well developed on each side of the back so as to give it a round appearance—not sharp—and should feel firm and hard. The top of the ribs should come out nearly straight, and the bones

over the kidneys giving breadth of loins and hips. Attention should be given to the curvature of the back ; its curvature downward enables a horse when ridden to carry the weight with greater ease to himself and to the rider. This curvature should not be too great or abrupt from the withers, as in the case of some horses, or what is worse, at the loins. A rouched back horse may in some cases be a fast trotter; but such formation is disagreeable to the eye, and not fit for the saddle. Too much attention cannot be given to the length and formation of the back for if a horse fails here he fails everywhere.

THE SHOULDERS AND THIGHS.—We now come to the machinery of locomotion, the running gear of the horse. In comparing a heavy draught horse with a fast trotter, leaving out the great difference in thickness, they will be found to differ much in two very important things. 1st. In the obliquity or slope of the shoulder blade and haunch. 2d. In the length of the forearm and large leg bone. In the trotter, the knee and hock joints come very low down and the distance from these joints up is very great, while, on the contrary, the draught horse has a straight shoulder and is square across the haunches, and has a short, thick forearm and leg, bringing the joints above mentioned high. It will be easily seen that this difference is what gives one the advantage in speed, the other in pulling, and can be easily demonstrated on purely mechanical principles.

The straight shoulder, the upper part of which with the neck is generally thick, allows the shoulder to bear on the whole length of the collar, and more of the horse's weight is thrown into it, or forward of the line of support, in the fore-legs. There is also an advantage gained in strength in the short fore-arm, for when the knee is bent, as in pulling, there is a greater leverage. The same is true in regard to the hind leg ; but horses thus built are necessarily slow.

It may be well to mention some of the advantages gained in speed, by the slanting shoulder and haunch,

and the greater length of the different bones connected with these. By this construction the elbow and stifle are carried forward and downward, which enables a horse to bring his foot far forward; it also helps to elevate the fore-part of the body and to sustain him through a long stride; at the same time he can come nearer to the ground, because his feet can be thrown straight forward when he strides it.

Another very important thing gained by this slanting direction, is the spring, which enables a horse to withstand the terrible shock and concussion arising from his weight being thrown violently upon his fore feet. Therefore upon the slant of the shoulders and pasterns depend greatly the safety of the joints. It will be seen also that in a long oblique shoulder blade the muscular power being attached to the lower part of it, that the line of direction to which the power is applied, will be nearer a perpendicular. In this and in the length of the bone, which is the arm of the lever, there is a mechanical advantage. Also there is this same advantage gained by a deep elbow and stifle where the bony process to which the muscles are attached projects out from the joint.

It is a law of mechanics that what is lost in power is gained in velocity. This applies to the long fore arm and leg above the hock joint. This is the kind of leverage that produces great speed, and is strongly marked in the grey-hound where the hock is carried very low down.

The muscles which control the action of these parts are very numerous and complicated, and their development of the greatest consequence; in proportion to their length is their degree of contraction and the extent of motion in the limb. For great speed, a long, full and swelling fore-arm is indispensable. But for a cavalry horse, or lady's horse, where a graceful, prancing action is desired, to the sacrifice of speed, as is also in the draught horse, the short fore-arm and proportionately long shank is required.

THE KNEE AND HOCK JOINTS.—Both of these joints are subjected to severe strain and are the seat of many of

the diseases that produce lameness. These joints should be large and symmetrical, and show a decided swelling at the knee and hock. However small the bones, it is a mark of strength and activity to have sharp and prominent processes at the joints, where these bones come together, to furnish sufficient surface for the attachment of the tendons. The hock bone should be as large and as long as symmetry will admit of. The back cord standing out as in Goldsmith Maid shows a strong joint.

The cannon bones or ankles, for a speedy horse should be flat and wide, looking fine and thin from the front view, and showing heavy, strong chords from behind; not bound down too close under the knee joint, as in the case of some horses, for this causes friction and loss of power. A clean, smooth ankle indicates solid, elastic bones. These bones in the slow dray-horse are large but more porous.

The fetlock, composed of the three bones called the pasterns, will also depend on its length and position, upon what is required of the animal. A short, straight pastern being best adapted for heavy pulling, as it will have greater strength and enable the horse to press harder on the toe; but this would make him more liable to stumble if driven fast, and with the straight shoulder would be very unpleasant to ride; while on the contrary, a longer and oblique pastern is more elastic, helps bring the heel first to the ground, and is better adapted for speed and graceful movement.

The pasterns are always more oblique in the fore than in the hind leg.

There is not much to be said upon the foot, without describing its anatomy. But a medium-sized, well-proportioned foot, smooth in appearance, slanting down at an angle of about 50° is the one most desirable. A compact, solid, tough looking foot, looking strong about the quarters, and well united to the frog, and having the sole of the foot well arched.

GENERAL REMARKS.—We have now gone over the principal parts of the horse, and endeavored to show

briefly the proper construction of each, for strength and speed, more particularly in regard to his frame work ; but we would not overlook the fact, that unless these several parts are well connected and overlaid with strong muscles, the bone structure would be useless.

It is too lengthly a subject to mention in detail the various parts of this animal, which make up his wonderful and complicated muscular structure.

But we will simply say that it is in accordance with the external fitness of things, in the workmanship of God, throughout nature, that the best and most perfect development of muscular power in the horse, is that which clothes him with the most perfect beauty, and symmetry of form, and give to his movements the most graceful and easy motion.

In buying a horse, act on your own judgment. Let eye and finger alike contribute to your decision. Feel of the bone, muscles and sinews. Never purchase a horse because he has a splendid development of one part, if he is deficient or lacking in other important points. Keep in mind what you are buying for, and try him thoroughly for the service required. Do not buy a horse for his noble pedigree unless he is noble himself. See that from the line of the rump to the ground surface of the hind quarters, that bone and muscle alike look as if they were of the same size and strength, and so admirably adapted in their proper position, that they can endure and do all things; and see that he is especially adapted for what you want of him, by applying the rules herein given.

The shape of the fore part of a fast trotter when viewed from the front, taking in the withers, shoulders and breast, is that of a wedge. The more perfect this shape the better, as it indicates high withers, smooth, even taper of the shoulders, and proportionate width of breast.

The dock of a horse should be strong ; it being the continuation of the bone and muscles of the back. A strong dock is naturally connected with a strong back, and it also indicates nerve.

See that he is well buttoned up behind, and that the evacuations are frequent and little at a time. Such horses have both nerve and good health.

A horse should have a fine glossy coat, which indicates good blood, good care and good temperament.

Attention should be paid to the color of a horse; dark bay, chestnut and brown are the most hardy colors; also a deep, dark, hazely brown is the best color for the eyes. Very light colored eyes are not so strong.

A good horse has the following

TWELVE POINTS:

Three like a Lady, Three like a Fox,
Two like a Grey-hound, Two like an Ox,
An ankle like the swift-running Deer,
And a warrior's spirit which shows no fear,

Like a Lady in beauty of form,
And her movements of grace,
In the intelligence and gentleness
That are seen in her face.

Like a fox, in his sharpness of ear
And his splendor of tail;
And also in his lightness of foot,
Having speed like the gale.

Like the hound in the form of his chest,
Made expansive and deep,
In the length and shape of his quarters
Giving greatness of sweep.

Like the Ox, for his fullness of eye
And his shortness of back;
A sign of his endurance and strength
Which he never should lack.



- 1 Caries of the lower jaw
- 2 Fistula of the parotid duct.
- 3 Bony excrescence or exostosis of the lower jaw
- 4 Swelling by pressure of the bridle.
- 5 Poll Evil
- 6 Inflamed parotid gland.
- 7 Inflamed jugular vein.
- 8 Fungus tumor, produced by pressure of the collar.
- 9 Fistula in the withers
- 10 Saddle-gall
- 11 Tumor of the elbow.
- 12 Induration of the knee.
- 13 Clap of the back sinew.
- 14 Malanders
- 15 Splint
- 16 Ring-bone
- 17 A tread upon the coronet.
- 18 Quittor.
- 19 Sanderack.
- 20 Contracted or ring-foot of a foundered horse.
- 21 Capped Hock.
- 22 Malanders.
- 23 Spavin.
- 24 Curb.
- 25 Swelled Sinews.
- 26 Thick Leg
- 27 Grease
- 28 A crack in front of the foot, called cow-crack.
- 29 Quarter-crack.
- 30 Ventral hernia.
- 31 Rat-tail

TO SHOW THE NAMES AND APPEARANCE OF EXTERNAL DISEASES OF THE HORSE.

DISEASES OF THE HORSE, CATTLE, SHEEP, HOG, DOG, FOWLS, ETC.

BY PROF LAW.

CHAPTER II.

CONTAGIOUS AND EPIZOOTIC DISEASES.

Their importance and classification. Disinfection. Horse-pox. Cow-pox. Sheep-pox. Goat-pox. Swine-pox. Dog-pox. Bird-pox. Aphthous fever, foot and mouth disease. Rinderpest, Russian cattle-plague. Lung-fever of cattle, contagious pleuro-pneumonia. Strangles. Influenza. Typhoid or bilious fever of horses. Distemper of dogs and cats. Malignant (Asiatic) cholera in animals. Intestinal fever in swine, hog-cholera. Texan fever in cattle. Canine madness. Malignant anthrax. Glanders and farcy. Venereal disease of solipeds. Tuberculosis, consumption.

These are among the most important of the whole range of diseases of animals, being the most destructive to the animals themselves and in many cases to man, and being at the same time, as a rule, preventible by a rigid adherence to sanitary laws. Of their devastations we have the most appalling accounts in the records of antiquity as well as in recent times. In the time of Moses they ravaged Egypt until, says the record, "all the cattle of Egypt died;" nor was man spared, for "boils and blains" broke out on man and beast.—*Ex. IX. 3.* At the siege of Troy the Grecian army was decimated by a similar infliction, animals and men perishing in a common destruction.—*Iliad.* So it has been down through the ages, the great extension of the plagues being usually determined by genual wars and the accumulation of cattle drawn from all sources (infected and sound) into the commissariat parks. In the first half of the eighteenth century,

it is estimated that 200,000,000 head of cattle perished in Europe in connection with the Austrian wars. These plagues again entered Italy in 1793 with the Austrian troops, and in three years carried off 3,000,000 to 4,000,000 cattle in that peninsula. More recently, rapid railroad and steamboat traffic and extended commerce have taken the place of war in favoring their diffusion. Free trade between England and the Continent since 1842 has cost the former \$450,000,000 in thirty years, and as much as \$40,000,000 in 1865-6 during the prevalence of the Rinderpest. A similar importation cost Egypt 300,000 head of cattle (nearly the whole stock of the country) in 1842, and others have caused ruinous but unestimated losses in Australia, Cape of Good Hope, and South America. On the other hand, some of the most exposed countries of Europe—Norway, Sweden, Denmark, Schleswig-Holstein, Oldenburg, Mecklenburg, and Switzerland—have long kept clear of these plagues by the simple expedient of excluding all infected animals or their products, and promptly stamping out the disease by the slaughter of the sick, followed by thorough disinfection, when they have been accidentally introduced. Exclusively breeding districts, in Spain, Portugal, Normandy, and the Scottish Highlands, into which no strange cattle are ever imported, also keep clear of nearly all of these destructive pestilences.

It is unquestionable that the animal plagues are propagated, in Western Europe and America, only by the disease germs produced in countless myriads in the body of a diseased animal, and conveyed from that to the healthy. It follows that the destruction of the infected subjects, and the thorough disinfection of the carcass, manure, buildings, etc., is the most economical treatment of all the more fatal forms of contagious disease in live stock. For the less fatal forms, the most perfect separation and seclusion, and the thorough disinfection of all with which they have come in contact, is still imperative.

To the first class of exotic maladies belong: *Small-pox, in sheep and birds*; the *lung-fever* or *contagious pleuropneumonia of cattle*; the *Rinderpest* or *cattle-plague*; the

malignant disease of the generative organs in solipeds; and malignant cholera in all animals. These demand separation, destruction, and disinfection. To the second or less fatal class of exotic maladies belongs: the *Aphthous fever* or *foot and mouth disease*. This demands seclusion and disinfection.

Besides these maladies, that are foreign to our soil and which are not to be feared except as the result of importation from abroad and subsequent transmission by contagion, there is a very important class which are apparently generated in America and thereafter spread by contagion. Among these may be named: *Glanders* and *farcy*, *canine madness*, *contagious foot-rot*, *tuberculosis*, *malignant anthrax*, *Texas-fever*, *intestinal fever of swine* or *hog-cholera*, *influenza*, *strangles*, *canine distemper*, and perhaps the *variola* or *pox of horse, cow, goat, pig, and dog*. All of these down to *intestinal fever of swine*, like foreign contagious affections, demand separation and disinfection, with destruction or not of the diseased, according to the severity and diffusibility of the particular malady. The remainder, from *influenza* onward, are either too mild to warrant such measures, or too easily spread to be satisfactorily controlled by them.

It is beyond the purpose of this work to enter into the special legislative enactments necessary to prevent the importation of foreign plagues, or the spread of native or imported ones. For this the reader is referred to the author's larger work. A few words on disinfection are, however, indispensable.

DISINFECTION.

The first and main object in disinfection is to secure perfect cleanliness. From the buildings, cars, loading banks, ships, quays, yards, manure-pits, drains, cess-pools, harness, clothing, utensils, etc., all decaying organic matter should be removed by scraping, washing, emptying, etc., as such decomposing organic matter is the food which sustains and preserves the disease germs out of the body. Even the water and air must be carefully seen to, since in close places they are usually

charged with invisible particles of organic matter in a state of decay, the most suitable field for the growth of contagious principles. These, too, tend to purify themselves in a free circulation of air, and ventilation may be largely relied upon for this purpose, unless the deleterious supplies are too abundant from some adjacent putrid accumulation, as dung-heaps, cess-pools, leaky drains, or soil saturated with filth. Purity of the surroundings kills many contagious elements on the principle of starvation.

Of agents reputed to be disinfectants, some act merely by changing the physical condition of organic matter, without any abstraction from, or addition to, its constituents. Thus, heating to the boiling point (212° F.), coagulates albuminous matters, and destroys infectious properties generally. But it must be prolonged for a variable time according to the size of the object, to allow of the heat penetrating to all parts alike. Clothing may be heated in an oven to 300° F., or safer, boiled, and even the prolonged application of hot transparent steam directed from a hose, upon wood-work, etc., previously well cleared is found very effectual. Some poisons, like that of Texas-fever, are destroyed by freezing, while others are unaffected.

Other disinfectants act by changing the chemical relations of organic matter, and hence of contagious principles, by uniting with them to form new compounds, by abstracting some of their constituent elements or by adding a new one. Thus the allotropic state of *oxygen* called *ozone*, produced abundantly during thunderstorms, is supposed to be one of nature's most potent disinfectants, acting by hastening the oxidation of organic matter. Yet, at times, its excess seems to be without effect, as in the influenza of horses in 1872. *Camphor* and many of the *odorous essential oils* are supposed to be of some slight use by reason of their developing ozone.

Burning is an effectual mode of disinfecting organic matter, old rotten wood-work, clothing, fodder, manure, &c. It may even be used on the air by moving a

plumber's charcoal-stove from place to place over the entire infected building. It may also be used over the opening of drains, or as a lamp in the ventilating of outlets of infected buildings.

Chlorine, set free from common salt, by adding oil of vitrol and a little black oxide of manganese, is an excellent disinfectant of the air, but can only be used in vacated buildings, and is most effectual in a full light.

Euchlorine, a compound of chlorine and oxygen, may be obtained by adding, at frequent intervals, a little chlorate of potassa to a glass of strong muriatic acid. It may be used in occupied buildings.

Sulphurous acid is another excellent disinfectant for the air, and can easily be produced in any amount by burning flower of sulphur on a slip of paper laid on an iron shovel. Like chlorine it is most efficient in daylight. In occupied buildings it may be burned carefully pinch by pinch without inconveniencing the stock.

Carbolic acid may also be used in occupied buildings, being allowed to evaporate from shallow basins, alone or mixed with ether or alcohol, from saturated rugs hung up at intervals, or from cloth-lined ventilating inlets, kept saturated with the acid; or, finally, it may be diffused through the air of a building by an atomizer. *Carbolic* and *cresylic acids* may also be used for disinfecting solids and liquids, being poured into drains or sprinkled on the floors, walls and other parts of the building. For the latter purpose, the strong acid may be diluted with one hundred times its weight of water. The cheap impure acid is usually preferred for dung-heaps, yards, and other outside purposes; but it is disagreeable indoors. *Coal-tar* and *wood-tar*, from their contained carbolic acid and allied products, are also good for out-door uses.

The following are especially applicable to solids and liquids:

Chloride of lime sprinkled on floors, yards, dung-heaps, etc., or applied to walls, wood-work, etc., or poured into drains, as a solution of $\frac{1}{2}$ lb. to a gallon of water.

Chloride of zinc is equally efficient but more expensive,

and *chloride of aluminium* (*chormalum*) is somewhat less potent.

Sulphate of iron (*copperas*) is one of the most efficient and cheapest disinfectants for drains, manure, floors, yards, etc., and may be applied either in fine powder or in solution.

The *sulphates of copper and zinc* and *perchloride of iron* are efficient but much more expensive.

Saturated solutions of caustic potassa and soda are satisfactory for wood-work, harness and utensils, but they are useless if diluted. *Lime* is useful in graves by absorbing the water and uniting with the organic debris, but is very unsatisfactory as a general disinfectant.

Permanganate of potassa promptly changes putrefying organic matter, rendering it sweet and wholesome, but it is questionable how far it can destroy living organic germs, of which many of the contagious principles are probably composed. The same remarks apply to *charcoal*, animal and vegetable, and to *earth*, especially that containing a considerable portion of clay or marl.

HORSE-POX.—This is probably identical with cow-pox, being indistinguishable when inoculated on men or cattle. It most frequently attacks the limbs, but may affect the face or other parts of the body. There is usually some little fever, which, however, passes unnoticed by the owner. Then swelling, heat and tenderness supervene, commonly in a heel, and firm nodules form, increasing to one-third or one-half an inch in diameter, the hair bristles up, and the skin reddens unless previously colored. On the ninth to the twelfth day a limpid fluid oozes from the surface and agglutinates the hairs in yellow scabs, on the removal of which a red raw depression is seen with the scab fixed in its centre. In three or four days the secretion ceases, the scabs dry up and the parts heal spontaneously. It is easily transmitted from horse to horse, to man, or to the cow. No treatment is required.

COW-POX.—This is the same disease appearing in the cow. There is a preliminary slight fever, usually over-

looked, succeeded by some diminution and increased coagulability of the milk and the appearance of the pox on the udder and teats. The udder is hot and tender for a day or two, then little pale red nodules, about as big as peas, appear, growing to three-fourths to one inch in breadth by the eighth or tenth day, acquiring liquid contents, and often a central depression on the summit. The liquid in each pock is contained in several distinct sacs, and cannot be all extracted without a succession of punctures on different parts. The liquid, at first clear, changes to yellowish white (pus) and soon dries up, the whole forming a hard crust, which is gradually detached. On the teats the blisters are early ruptured and raw sores form, often proving very obstinate, and even leading to infection of the udder, abortion, or death.

Treat.—scarcely ever demanded further than to obviate soreness on the teats. A mild laxative of Epsom salts is, however, usually desirable. The teats may be smeared with an ointment formed of an ounce each of spermaceti and almond oil and half a drachm of myrrh. Milking tubes may be necessary to avoid injury by drawing the teats.

In many localities the disease appears to all newly-calved heifers on particular farms, in which case it would be well to purify the barns by a thorough disinfection.

SHEEP-POX.—Though unknown in America, there is a probability of this disease reaching us, through the importation of sheep, hides or wool. Like *small-pox* of man, it is only known as a contagious disease. The *incubation* or *latent period* of the poison after it enters the system, is from three to six days in summer and from ten to twelve in winter. Then there is loss of appetite, dullness, dropping behind the flock, and stiffness of the hind parts. This is followed by trembling, increased temperature, very manifest on the bare and delicate parts of the skin on which the eruption usually takes place, loss of appetite and rumination, costiveness, red, weeping eyes, a discharge from the nose, and the appearance of red patches inside the limbs and along the

abdomen. Soon minute red points appear, and increase to papules with a firm base, extending into deeper parts of the skin. These are flat on the summit, (rarely pointed or indented), and become pale or clear in the centre from the effusion of liquid beneath the scurf skin, with a red margin. With the appearance of the eruption the fever moderates, but increases again in three or four days, with the development and irritability of the vesicles. These may remain individually distinct (*discrets*), in which case the attack is mild, or they may run together into extensive patches (*confluent*) and the result is likely to be serious. The pocks will even appear on the digestive or respiratory mucous membrane. The eruption passes through the same course of exudation, suppuration, drying and dropping off as in cow-pox. The duration of the disease is three weeks or a month. The mortality in the milder forms may not exceed seven per one hundred, in the more severe it may destroy almost the whole flock. But the losses of lambs by abortion, of wool, sight, hearing, hoofs, digits, flesh and general vigor, often render recoveries anything but unmixed blessings.

Treatment.—Keep in cool, dry, well-aired and littered sheds, shelter from rain, and feed roots, or, if very weak, oat and bean meal gruels, with a drachm of saltpetre to each sheep. Common salt may be supplied to be licked, and the drinking water may be slightly acidulated with vinegar. The bowels should be opened by injections of milk-warm soap suds, or 3oz. sulphate of soda if necessary. Avoid heating agents. In the advanced stages support by quinia, gentian, nitric acid, and nutritious gruels, even animal broths. The pustules may be treated with the ointment advised for cow-pox, or, if unhealthy, with weak solutions of chloride of zinc.

Prevention.—Nothing short of general infection will justify the treatment of this disease. It should be excluded from our country by the most stringent supervision over the importation of sheep and their products, and when it does appear should be promptly stamped out by the destruction and disinfection of the sick and

the purification of all with which they have come in contact. *Inoculation* as a measure of prevention is unwarrantable except in the case of wide-spread infection, a contingency which ought never to arise in this country.

GOAT-POX.—This is a rare and mild affection with an eruption on the udder and teats closely resembling that of *Cow-pox*. It has been thought to be spontaneous in the goat, but is known to be derived from sheep suffering from *Sheep-pox*. It follows a mild course and requires the same care as *Cow-pox*. Seclusion or destruction and disinfection are, however, imperative when danger is likely to arise for sheep.

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in cattle **SWINE-POX.**—This is more frequent than *Goat-pox*. It is communicable to man and goat. Young pigs are thought to be most liable. The eruption appears inside the forearm and thighs and is usually preceded by considerable fever. It is *discrete* or *confluent* like *Sheep-pox* and the severity corresponds. The duration of the mild forms is twelve to fifteen days. *Treatment* is similar to that of *Sheep-pox* and the same precautions should be taken to prevent its dissemination.

DOG-POX.—These animals sometimes contract *Small-pox* or *Sheep-pox* and have been supposed to have their own specific form besides. The young suffer most frequently and severely. There is the usual preliminary fever with an eruption on the sides and belly, passing from pimples to vesicles and pustules, and finally drying up into crusts which drop off. The eruption may be *discrete* or *confluent*, the latter being very fatal. Similar *preventive* measures are demanded as in the other forms of *pox*.

BIRD-POX.—Birds seem susceptible to different forms of *variola*, having contracted the disease from man in some cases, and in others conveyed it to the sheep. Chickens failed to contract *Cow-pox* in the experiments of Roll and myself. It has proved very fatal in chickens, but very slightly so in pigeons, turkeys and geese. The eruption appears mainly on the head, under the wing,

on the tongue, or in the pharynx. In fatal cases death ensued in four or five days. *Treatment* would rarely be desirable, the great point being to stamp out the malady by destroying the diseased and disinfecting the place.

APHTHOUS FEVER.—FOOT AND MOUTH DISEASE.—

A contagious eruptive fever, attacking cloven-footed animals and communicable to other warm-blooded animals, including even man. Its special feature is the eruption of blisters in the mouth, on the udder and teats and on the feet. It is only known as communicated by contagion, whether in western Europe, in Great Britain and Ireland, where it was introduced in 1839-42, or in North and South America, which it reached in 1870 by imported stock. Like the other animal plagues it follows in the track of great armies and in the channels of commerce. The contagion does not readily spread on the air, a river or common road being often sufficient to limit it, but no poison is more certainly transmitted by contact, direct or through the medium of human beings, tame or wild animals, fodder, litter, manure, clothing, drinking-troughs, etc., etc. Milk is one of the most frequent sources of contagion to pigs, dogs, and even to infants, producing the most dangerous intestinal irritation and diarrhoea.

Symptoms.—The poison may remain latent in the system for one or two days, or, in exceptional cases, perhaps as many as six. Then there is roughness of the coat or shivering, increased temperature, dry muzzle, hot red mouth, teats, and interdigital spaces, lameness, inclination to lie, and shrinking from the hand in milking. The second or third day blisters arise, on any part of the whole interior of the mouth one-half to one inch in breadth, or on the teats and between the digits about one-half inch across. Saliva trickles from the mouth, collecting in froth around the lips, and a loud smacking is made with the lips and tongue. Swine champ the jaws. Sheep and swine suffer more especially in the feet, often losing the hoofs or even the digital bones, a contingency not unknown in neglected cattle.

Among the consequences may be named the loss of milk, inflamed udders, blind teats, a habit of vicious kicking, abortions, permanent lameness, and a lengthened incapacity for the dairy, for feeding or work. If well cared for, the disease passes in fifteen days, leaving no ill consequences, excepting the poison hidden away in the building. The average loss in flesh is \$5 to \$10; in dairy cows it is much more.

Treatment.—A laxative (Epsom salts); astringent mouth-wash (Borax and tincture of myrrh, 1 oz. each; water 1 qt., or carbolic acid 1 dr., honey 2 oz., vinegar 1 pt., water 1 pt.); a lotion for the teats (carbolic acid $\frac{1}{2}$ dr., glycerine 10 oz.); and a dressing for the feet (oil of vitriol 1 oz., water 4 oz., to be applied with a feather after cleaning the space between the hoofs by drawing a cloth through it). After dressing, tie up the feet in a tar bandage. The hind feet are easily dressed if two men raise each separately with a long stout for- handle passed in front of the hock. In dressing the feet, all detached horn should be removed and a poultice applied if inflammation runs high. Soft cold mash or thinly sliced or pulped roots are the best food throughout.

Prevention.—Importation of diseased animals should be sufficiently guarded against. Diseased stock should be rigidly secluded from all but the necessary attendants who ought to be disinfected on leaving the enclosure. Wild animals, even birds, should be excluded. Every place where the diseased have been, should be closed for a winter or disinfected, the milk should be buried in a safe place, or boiled and given to pigs; manure, infected litter, etc., may be burned, or disinfected, removed and plowed under by horses. No diseased animal should be moved until fifteen days after full recovery, and it should first be sponged over with a carbolic acid wash.

RUSSIAN CATTLE PLAGUE, RINDERPEST.—A contagious fever of cattle communicable to other ruminants and characterised by a general congestion of the mucous membranes, but, above all, those of the stomach and intestines, and an excessive growth and shedding of the

superficial layers of cells on the skin and mucous membranes. It is only propagated by contagion, at least, out of the Kirghiz Steppes and Kherson district in Southern Russia, but spreads further on the air than *Aphthous Fever*.

Symptoms.—Incubation lasts about two days until the temperature of the body is elevated, or four days until the appearance of outward signs of illness. By this time the mouth, inside the lips, on the dental pad of the upper jaw or around the gums of the lower front teeth, shows minute white elevations, like the aphtha of the mouths of children, calves and lambs suffering from thrush (muguet). This may be exceedingly slight and transient but is most characteristic. The other mucous membranes, (eye, vulva, rectum, nose,) show a more or less dark flush and concretions may appear around these and on other parts of the skin, especially the teats. These are solid aggregations of epithelial cells, not vesicles nor pustules. In twenty-four hours they undergo fatty softening and are easily detached, leaving small pink erosions, and by the sixth day a great part of the mouth and muzzle may have become raw, and the surrounding mucous membrane of a deep red. About the fourth day the skin feels greasy, and dullness and impaired appetite and rumination appear. In cows the milk is diminished, richer in cream, and even slightly coagulable. Urine becomes scanty and of a high color and density. These signs increase until the sixth day, when the mouth is often raw, saliva drivels, appetite and rumination are gone, bowels relaxed, the dung passed with much straining and pain, the everted gut appearing of a deep red or port-wine hue, the ears are drawn back, head pendent, eyes half-closed and watery, back arched and often insensible to pinching, abdominal muscles tense and resistant, and there is a peculiar check in the act of expiration, the breath being suddenly arrested with a flapping sound and concussion of the entire body, to be exhaled a second or two later with a grunting noise. Sighing and whistling sounds are heard in the chest and it becomes unnaturally drum-like to percussion. A sudden lowering of tempera-

ture is usually the precursor of death, which happens on the seventh or eighth day.

Nervous symptoms appear in some outbreaks, with delirium, butting, shivering and tenderness of the loins. while in the milder cases the peculiar eruption may be almost altogether confined to the skin.

The mortality out of its native habitat usually amounts to forty per cent. and upward.

Treatment.—The treatment of this plague should be legally prohibited under all circumstances. All the attempts of the different schools of medicine and of empiricism have only increased its ravages, while nations and even countries and districts that have vigorously stamped it out and excluded it have saved their property.

Prevention.—The advent of this plague should be prevented by a sufficient supervision of our ports and frontiers and a quarantine of stock. If admitted, the victims should be ruthlessly destroyed, deeply buried, and all places and things with which they have come in contact disinfected in the most perfect manner.

THE LUNG-FEVER OF CATTLE—CONTAGIOUS PLEURO-PNEUMONIA.—A specific contagious fever of cattle, with extensive exudations into the chest and lungs.

Like the other plagues already noticed, this is only known in Europe and America as a contagious disease. Its importation into the different countries of Europe has always been traceable to the introduction of diseased beasts or their products. The assertion of the immortal Haller, more than a century ago, that it is propagated by contagion, has received the amplest confirmation in recent times. It invaded Ireland in 1839-40 by Dutch cattle, England in 1842 by Irish and Dutch cattle, Sweden and Denmark in 1847 by English stock, and later again by English and Dutch, Norway in 1860 by infected Ayrshires, Oldenburg in 1858, and Schleswig in 1859, in each case by Ayrshires, the Cape of Good Hope in 1854, Australia in 1858 by an English cow, Brooklyn L. I., in 1843 by a Dutch cow, and again in 1850 by ar

English one, New Jersey in 1847 by English stock, and Boston, Mass., by Dutch cattle in 1859. In Sweden, Norway, Denmark, Oldenburg, Schleswig, Massachusetts and New Jersey, it was stamped out, in the last case by the importer, Mr. Richardson, sacrificing his whole herd and voluntarily assuming the loss, but in the other places named it was left to itself and spread disastrously.

Symptoms.—The period of latency of the poison in the system is from four to six weeks, and in exceptional cases perhaps two or three months or as short as ten days. Increased temperature of the body usually appears a week or two before other symptoms. Then there is a slight cough, erection of hair along the back, sometimes shivering and always tenderness of the back to pinching, the animal crouching and groaning. Soon breathing and pulse become accelerated, bowels costive, urine scanty and high-colored, milk diminished, appetite impaired, rumination irregular, nose alternately moist and dry, and legs and horns cold and hot. If in the field, the sick leave the herd. The cough increases in harshness, depth and painfulness, and all the symptoms are aggravated until the animal stands in one posture, with head extended on the neck, mouth open, and every breath accompanied by a loud moan. From the earliest stages the ear applied to the sides of the chest detects an absence of murmur over particular parts of the lung, or lungs, with a line of crepitation (fine crackling) around it, and occasionally rubbing, wheezing, and other unnatural sounds. On percussion over the silent parts the natural resonance is found to have given place to dullness, and the animal winces and groans. Other peculiar sounds may follow later, into which we cannot enter here, and exhausting liquid discharges from the bowels and kidneys, tympanies and abortions are frequent results. Death may take place early, from suffocation, when both lungs are involved, or may be delayed six weeks or more.

The percentage of deaths and permanent destruction to health is fifty or sixty, or when all the more susceptible animals have perished it may be reduced much lower.

Treatment.—This disease is much more amenable to treatment than Rinderpest, but to preserve the sick is no less reprehensible, as the poison is more subtle, more diffusible through the atmosphere, is hidden unsuspected for a greater length of time in the body of its victim, and when manifested is far more liable to be mistaken for other diseases (pneumonia, pleurisy, bronchitis). No treatment should ever be allowed, except in perfectly secluded buildings, far from roads, where no strange men or animals can get access, and in a constantly disinfected atmosphere.

In the early stages, refrigerant and diuretic salts (liquor of the acetate of ammonia, nitre, bisulphite of soda) with aconite may be given; injections of warm water or mild laxatives (Epsom salts) used to regulate the bowels, and blisters applied to the sides of the chest (mustard and oil of turpentine). Later, when prostration sets in, stimulants (sweet spirits of nitre, wine, aromatic ammonia, etc.) and tonics (gentian, cinchona, cascarilla, boneset, sulphate of iron, or copper, mineral acids, etc.) are called for. Antiseptics are useful, especially such as can be inhaled in the air (sulphur fumes, carbolic acid vapor or spray) and thus reach the seat of disease.

The hydropathic treatment, by a rug rung out of water applied next the skin and covered by several dry ones kept closely applied by elastic surcingle for an hour and followed by a cold douche and active rubbing till dry, has proved very successful, but demands intelligence, enthusiasm and activity on the part of the attendants. The pack is repeated as often as the temperature rises.

Prevention.—Importation should only be allowed from countries free from the plague, in ships that have carried no suspected stock for at least three months, and after inspection and, if thought necessary, quarantine, at the port of entry. But the disease already exists in New York, (Connecticut,) New Jersey, Delaware, Pennsylvania, Maryland, Virginia and District of Columbia. This ought to be rooted out by measures executed by the central government and defrayed out of the public treasury.

Little good must be looked for from isolated action by States, counties, townships, or individual owners; the danger threatens the entire country, and for the general safety all must pay. It is absurd to expect the unfortunate possessor of sick animals to beggar himself for the public good. There should be destruction of the sick, partial remuneration of the owners, thorough disinfection under professional supervision, and the most perfect control and constant inspection of all suspected herds and places until the malady has been eradicated from the land. This is the most insidious of all our animal plagues, the one which now most urgently presses for active interference, and which, if neglected, will bring a terrible retribution in the future.

Inoculation, as a preventive, like medical treatment, is suicidal unless where a country is very generally infected.

STRANGLES. — DISTEMPER IN YOUNG HORSES. —

A specific fever of young solipeds, usually attended with swellings and formations of matter between the bones of the lower jaw, or elsewhere in groups of lymphatic glands.

Causes.—Early age, change from field to stable, from grass to dry feeding, from idleness to exciting work, the irritation of teething, and, above all, change of locality and climate. Repeated attacks will occur in the same horse under the influence of the last named cause. Exposure to cold and wet, impure air, sudden thaws, etc., contribute to hasten its development. Lastly, contagion is a common cause, and, in some cases, the malady may be even conveyed to man.

Symptoms.—The disease is often preceded by a period of unthriftiness, staring coat, loss of condition, dulness and languor. Then there appear cough, redness of the nasal membrane, and watery flow from the nose and eyes, slavering, accelerated breathing and pulse, costiveness, scanty high-colored urine, and increased thirst. Soon a swelling rises between the bones of the lower jaw, hot, tender, and uniformly rounded and smooth, at first

hard with soft, doughy margins, later soft and fluctuating in the centre from the formation of matter. Water is often returned from the nose in drinking, and food dropped after chewing. The throat may even be closed so as to make breathing laborious, difficult and noisy, or quite impossible. With rupture of the abscess and escape of the matter relief is obtained, and a steady recovery may usually be counted on.

Irregular Forms.—The swelling may harden in place of softening, and maintain the disease for an indefinite time, or it may disappear and be followed by the formation of matter in other and more vital organs. Thus matter may form in the groups of lymphatic glands about the shoulder, groin, the roots of the lungs, the mesentery, the brain, etc. Sometimes no swelling nor suppuration takes place beyond the discharge from the nose, while at others a postular eruption on the skin is the manifestation of the disease.

The disease may be over in ten days, or, in cases of indolent action in the swelling, it may be protracted for months. If properly treated, the *regular form* generally does well, but the *irregular* is fatal in proportion to the vitality of the organ affected. In protracted cases, and in those subjected to impure air and weakening treatment, dropsical and sanguineous swellings in the dependent parts of the body (*purpura hæmorrhagica*) is a frequent result.

Treatment.—Sustain the strength of the patient by abundance of soft, nourishing mashes and pure air, and promote the formation of matter between the jaws by fomentations, poultices, and steaming of the nostrils. A poultice may be applied by a square of calico with holes for the ears and eyes, tied down the middle of the face and sewed up a little at the chin to prevent any from dropping out. Bran or oil meal may be used along with hot water. Steaming may be done by feeding hot bran mashes from a nose bag hung on the head. When matter points it should be freely evacuated with the lancet, and the poultices continued to complete the softening. If suffocation is threatened, the windpipe must be opened

in the middle of the neck, and a tube inserted to breathe through.

Medicine is rarely required. Yet costiveness may be counteracted by warm water injections, and weakness by stimulants (muriate and carbonate of ammonia) and tonics (ger-tian, columba, willow-bark). Complications must be treated according to their nature.

INFLUENZA.—A specific epizootic fever of a low type, associated with inflammation of the respiratory mucous membrane, or less frequently of other organs. It has prevailed at intervals over different parts of the world in man, horses, dogs, and even cats.

Causes.—Nothing can be definitely stated as to the primary cause of its development, as all peculiar conditions of soil, volcanic action, atmospheric electricity, aerial moisture or dryness, density or levity, season, temperature, winds, calms, ozone, and antozone, fail to account for its appearance. The great American epizootic of 1872 was preceded and accompanied in Michigan by an excess of ozone, but the excess did not determine its appearance in other States, which it invaded by a gradual progress and with a rapidity proportional to the celerity of communication. Again, insular and sequestered places escaped, as Prince Edward Island (frozen out), Vancouver's Island (quarantined), Key West, Hayti, St. Domingo, Jamaica, La Paz, by the non-importation of horses (Cuba suffered through imported American horses). It stopped at Panama, where there is no horse traffic owing to the state of the country. (See the author's report to Government, and report of New York Board of Health.)

Symptoms.—The disease comes on suddenly, with extreme weakness and stupor. There is often pendent head, half-closed, lustreless eyes, great disinclination to move, with swaying gait, and cracking joints. Appetite is lost, mouth hot, clammy, bowels costive, urine scanty and high-colored, pulse accelerated and weak (sometimes hard), a cough, deep, painful, and racking, comes on, crepitation or harsh blowing sounds are heard in the

chest, and the membrane of the nose assumes a bright pink or dull leaden hue. The ears and limbs are alternately cold and hot, the hair rough, the skin tender and frequently trembling.

Soon the nose discharges a white, yellowish, or greenish matter, and the animal may recover, or an increasingly heavy breathing, depth and painfulness of cough, and changed or absent respiratory sounds in the chest, with dulness or percussion, show that the lungs are seriously involved. Thus there may be the symptoms of pneumonia, pleurisy, bronchitis, hydrothorax, pericarditis, hydro-pericardium, etc. Clots sometimes form in the heart, modifying the heart sounds and proving rapidly fatal.

In other cases the abdominal organs suffer, and with great torpor, stupor, tension, and tenderness of the abdominal walls, there are colicky pains, ardent thirst, coated tongue, yellowness of the membranes of the nose and eyes, yellow or reddish urine, costive bowels and dung in pellets thickly coated with mucus.

Sometimes rheumatic swelling and tenderness take place in the muscles and joints of the limbs, and may even last for months. In others, paralysis or delirium will ensue, or, finally, severe inflammation of the eyes.

Treatment.—Overcome costiveness by injections of warm water, or by one-third the usual doses of linseed oil or aloes. Give mild febrifuge diuretics (liquor of acetate of ammonia, spirit of nitrous ether), with anodynes (extract of belladonna), and when fever subsides or great prostration comes on, stimulants (nitrous ether, aromatic ammonia, carbonate of ammonia), and even tonics (gentian, calumba, quassia).

Counter-irritants (ammonia and oil, equal parts, mustard, etc.) may be used from the first to the throat, sides or abdomen, according to the seat of the inflammation.

Soft mashes, roots, or green food, pure air without draughts, and warm clothing are essentials of treatment throughout.

If the *abdominal organs* are the main seat of disease, supplement the medicines above named by demulcents (slippery elm, mallow, boiled linseed), and anodynes

(opium, hydrocyanic acid), with, in some cases, a gentle laxative (olive oil). *Nervous symptoms* may demand wet cloths to the head, blisters to the sides of the neck, purgatives, unless contra-indicated, and bromide of potassium. The *rheumatic* complication must be treated like ordinary rheumatism, with colchicum, propylamine, acetate of potassa, turpentine, warmth, counter-irritants, etc.

The following system of treating the epizootic influenza is practiced by a well-known veterinarian :

"Good nursing is the primary requisite in all cases. Keep the stall clean and dry, and admit a proper amount of pure air, without having a draft directly over the horse. Chloride of lime should be used as a disinfectant, and sunlight admitted in clear weather. Keep the animal carefully blanketed and groomed, as good rubbing opens the pores of the skin and circulates the blood to the surface and extremities. The following prescription has been used with great success in Boston, New York and Chicago :

SULPHUR.....	8 oz.	} MIX THIS WELL.
POTASSÆ NITRATE	4 oz.	
PULVERIZED GINGER.....	3 oz.	
PULVERIZED DIGITALIS.....	1 oz.	

The dose, a tablespoonful, may be given with the food, which should be a hot bran mash, when the horse will eat, or laid upon the tongue when nourishment and food are refused. The effect is almost immediate ; the cough subsides, the catarrhal indications grow less, the fever ceases, and appetite is resumed.

If the throat is sore and swallowing difficult, it will be necessary to apply a counter-irritant to the throat, or if the lungs are affected, to the chest. The following never fails to give immediate relief :

SPIRITS TURPENTINE.....	2 oz.
LINSEED OIL.....	1 oz.
F. F. F. AMMONIA.....	1 oz.

Mix well and apply to the affected parts thoroughly."

TYHPOID, GASTRIC OR BILIOUS FEVER. — This strongly resembles the abdominal form of influenza, and

sometimes occurs in the same place at the same time. It also appears independently in horses weakened by shedding their coats in spring and autumn, in those kept in a hot, close, impure and unwholesome atmosphere, fed insufficiently or on badly preserved, musty, or otherwise injured aliment, supplied with water containing an excess of decomposing organic matter, fed irregularly, subjected to overwork, etc. Finally, it proves contagious in confined insalubrious buildings, and, to a less extent, in those that are wholesome and well aired. Some unknown generally acting influence makes it more virulent at one season than another.

Symptoms.—There are a few days of dulness and lassitude, followed by the general signs of fever:—Staring coat, shivering, alternate heat and coldness of the surface, restlessness, hot dry mouth, and elevation of the internal temperature of the body. There is a yellowish tinge of the mucous membranes, costiveness, colicky pains, full, tense, tender belly, passage of a few dark, hard pellets of dung covered with a mucous film, urine scanty, reddish, and depositing a sediment, pulse rapid and weak, and there may or may not be sore throat, excited breathing and discharge from the nose. In the more favorable cases, signs of improvement are noticeable in eight or nine days, and a perfect recovery is made. In the unfavorable, the pulse becomes small, weak and rapid (eighty to ninety per minute), the mouth hotter, more clammy, and covered by yellowish, brownish or greenish blotches, the abdominal walls more tender, the bowels more irritable, sometimes with a foetid diarrhoea, and the strength is rapidly exhausted. The head is constantly pendent, the eye sunken, the expression of the countenance stupid and haggard, and the stupor or insensibility may become so great that pinching or even pricking of the skin may pass unnoticed by the animal. Death usually takes place from the tenth to the twentieth day.

Treatment.—English veterinarians rely much on calomel, and with a firm full pulse, not too rapid, a general warmth of surface and extremities, a bright eye, cheerful

countenance, whitish foetid dung, and much yellowness of the eye, nose or mouth, a few doses of calomel (10 grs.) and opium (30 grs.) repeated twice daily, may be useful in stimulating the liver and throwing off injurious agents from the blood. But it is to be avoided when there is a weak, rapid pulse, and great prostration and debility, and in no case should it be given over two or three days, or until the system is saturated with the drug. Severe constiveness may be obviated by 2 or 3 drs. of aloes and a drachm of calomel, or by a daily dose of 2 or 3 ozs. of Glauber salts until relaxation occurs. Soft feeding and copious injections of warm water must be continued to maintain the bowels in a healthy state. A drachm each of chlorate or nitrate of potassa and muriate of ammonia may be given three or four times daily with the water drunk, or in case of great dulness and debility, an ounce of oil of turpentine, sulphuric ether, sweet spirits of nitre, or carbonate of ammonia, may be given as well. Great tenderness of the belly may be met by persistent hot fomentations and mustard poultices, and if necessary by half-drachm doses of opium. Tympany is treated by hand rubbing and by aromatic ammonia or oil of peppermint. During recovery 3 or 4 ozs. of tincture of gentian or cinchona may be given twice daily with muriate of iron and stimulants. Feed throughout on soft bran mash, sliced roots, boiled oats or barley, green grass, oil-cake, etc., giving from the hand if necessary. Secure pure air and water, cleanliness, warm clothing and general comfort until restored to health.

Maladie de jeun
CANINE DISTEMPER.—A specific fever of the young domestic carnivora, affecting the respiratory organs, and it may be the abdominal viscera, the brain, the muscular system and joints, or the skin. One attack usually protects from a second.

Causes.—Connected, like strangles, with domestication, it is most severe on pet dogs kept in hot, close rooms on spiced food, or confined in kennels. Change of climate, teething, and contagion, are other causes.

Symptoms.—Dulness, peevishness, loss of appetite, dry

nose, watery eyes, elevated temperature, increased pulse (110 to 120), sensitiveness to cold, shivering, cough and glairy or yellowish discharge from the nose. The cough becomes paroxysmal and often followed by vomiting, the matter not being licked up again, the breathing is disturbed, and the chest sounds on auscultation and percussion imply disease there. The animal is weak, debilitated and emaciated, and diarrhoea, ulceration of the mouth, and nervous symptoms usually precede death.

The complications are marked by symptoms of bronchitis, pneumonia, enteritis, hepatitis, conjunctivitis, phrenitis, and skin-disease. Diseases of the brain (cramps, convulsions, chorea, paralysis,) and skin-eruption are exceedingly common in the advanced stages. The eruption is peculiar, consisting of small blisters, containing often a reddish or purple fluid.

Treatment.—A warm, comfortable bed, pure air, and a milk, or bread and milk, diet are important. The diet should not be so exclusive in dogs having had animal food only.

A mild emetic (antimonial wine), or a slight laxative (castor oil), may be followed by tonics (gentian, quinia), febrifuges (saltpeter), and expectorants (ipecacuanha), with perhaps an anodyne (belladonna). As fever subsides, tonics must be given freely (wine, quinia, sulphate of iron, Fowler's solution). In all the various complications treat as for the different diseases, but avoid weakening remedies, and keep up tonics, stimulants, and a rich diet.

MALIGNANT CHOLERA.—ASIATIC CHOLERA.—This attacks the domestic quadrupeds and birds simultaneously with man, and has been produced experimentally by feeding the dried bowel discharges. These were found to increase in virulence from the first to the third day, and to decrease to the fifth day, after which they were harmless (Sanderson).

Symptoms.—Muscular cramps, great prostration, partial loss of motor power and excitability, great lowering of the body temperature (80° F.), deathly-cold bloodless extremities, viscid tardily-flowing blood, and lastly, violent

abdominal pains and fluid bowel dejections, often having the specific *rice-water* appearance.

Treatment.—The disease is mainly important as propagating a poison so fatal to the human being, hence the most perfect disinfection of all bowel dejections is imperative, together with the seclusion and burial of the sick and dead. As an example of current treatment may be named aromatics (oil of anise, oil of cajeput, oil of juniper, tincture of cinnamon), stimulants (ether), and acids (sulphuric acid), mixed and given every quarter of an hour. In the early stages add opium to check diarrhœa. To overcome surface coldness and collapse, use hot fomentations, rubbing, inhalation of nitrate of amyle; to sheath the intestines, demulcent drinks (linseed tea, mallow, slippery elm), and to meet other states according to indications. Every separate case would demand special treatment.

In fowls, change of the yard, and sulphate of iron and carbolic acid in the water are especially reliable to check.

INTESTINAL FEVER IN SWINE—HOG-CHOLERA.—A specific contagious fever of swine, attended by congestion, exudation, blood extravasation, and ulceration of the membrane of the stomach and bowels, by liquid foetid diarrhœa, by general heat and redness of the surface and by the appearance on the skin and mucuous membranes of spots and patches of a scarlet, purple, or black color. It is fatal in from one to six days, or ends in a tedious, uncertain recovery.

Symptoms.—Incubation ranges from a week or fortnight in cold weather to three days in warm. It is followed by shivering, dulness, prostration, hiding under the litter, unwillingness to rise, hot, dry snout, sunken eyes, unsteady gait behind, impaired or lost appetite, ardent thirst, increased temperature (103.2° to 105° F.) and pulse. With the occurrence of heat and soreness of the skin, it is suffused with red patches and black spots, the former disappearing on pressure, the latter not. The tongue is thickly furred, the pulse small, weak and rapid, the breathing accelerated and a hard, dry cough is fre-

quent. Sickness and vomiting may be present, the animal grunts or screams if the belly is handled, the bowels may be costive throughout but more commonly they become relaxed about the third day and an exhausting foetid diarrhoea ensues. Lymph and blood may pass with the dung. Before death the patient loses control of the hind limbs, and is often sunk in complete stupor, with muscular trembling, jerking and involuntary motions of the bowels.

Causes.—It is mainly propagated by contagion, though faults in diet and management may serve to develop it. The poison will blow half a mile or more on the wind, and is with difficulty destroyed in hog-pens, fodder, etc.

Treatment ought not to be permissible, unless in a constantly disinfected atmosphere. Feed, well-boiled gruel of barley or rye, or, in case these raise the fever, corn-starch made with boiling water; give to drink fresh cool water, slightly acidulated with sulphuric acid. For the early constipation give a mild laxative (castor oil, rhubarb,) and injections of warm water, followed up with fever medicine (nitrate of potassa and bisulphite of soda). If the patient survives the first few days and shows signs of ulceration of the bowels (bloody dung, tender belly,) give oil of turpentine fifteen or twenty drops night and morning. Follow up with tonics, and careful soft feeding.

Prevention.—Kill and bury the diseased; thoroughly disinfect all they have come in contact with; watch the survivors for the first sign of illness, test all suspicious subjects with the thermometer in the rectum, and separate from the herd if it shows more than 103° F., destroying as soon as distinct signs of the disease are shown. Feed vegetable or animal charcoal, bisulphite of soda, carbolic acid, or sulphate of iron to the healthy, and avoid all suspected food, places, or even water which has run near a diseased herd. All newly purchased pigs should be placed at a safe distance in quarantine under separate attendants until their health has been proved.

TEXAN FEVER.—A specific fever, rising in the low, malarious grounds of the States bordering on the Gulf of

Mexico, and communicable to the cattle of the elevated lands of the same and other States in a more fatal form. It is characterised by an enlarged spleen, profound changes in the blood, escape of the blood elements into the substance of the various tissues and with the urine, causing bloody discharges from the kidneys, yellowness of the mucous membranes and fat, great prostration and debility.

Symptoms.—There seems to be an incubation of four or five weeks, ending in elevated temperature (103° to 107°) and followed in five to seven days by dulness, languor, drooping head till the nose reaches the ground, arched back, hind legs advanced under the belly and bent at the fetlocks, cough more or less frequent, muscular trembling about the flanks, jerking of the neck muscles, heat of horns, ears and general surface (limbs cold—in exceptional cases) and impaired appetite and rumination. Soon weakness compels lying down, by choice in water, eyes are glassy and fixed, secretions lessened, dung hard and coated with mucus, or with clots of blood, and the urine changes to a deep red or black and coagulates on boiling. The mucous membranes are of a deep yellow or brown, that of the rectum seen in passing dung is of a dark red, as in Rinderpest.

All these symptoms become aggravated, weakness becomes extreme, and the patient dies in a state of stupor, or sometimes in convulsions.

The disease usually passes unnoticed in the Texan cattle, but is exceedingly fatal in northern beasts.

Contagion takes place through the bowel discharges, and roads, pastures, water-courses, etc., become efficient bearers of the virus. It is destroyed at once by frost, and has never been satisfactorily demonstrated to be conveyed from one northern animal to another. Sucking calves rarely suffer. One attack does not protect against another.

Prevention.—It should be enforced by United States law that no Gulf-coast cattle should be moved north excepting after the first frosts of autumn, or before the last frosts of spring. Then would the traffic be safe for all

the North. The time would vary for the different States, but the earlier or later traffic for the extreme north should be by direct route without intermediate unloading. A general restriction of this sort, with the expense levied on all the States, would be more economical and satisfactory than a supervision by each State of its own frontier.

Treatment should never be called for. It may, however, be resorted to with less danger than in the case of a true plague. In some cases emollient drinks and enemas, soft food and stimulating fever medicines have been followed by recovery. Chlorate of potassa, nitre, iodide of potassium, and carbolic acid have evidently been of advantage. Wet-sheet packing, as for Lung-fever, should be beneficial, and refrigerant or stimulating diuretics (digitalis, nitre, or nitrous ether,) according to the indications of the particular case. Peculiarities in different cases would demand a variation of treatment. The diet throughout should be of soft mashes, and a return to ordinary fibrous aliment made slowly and carefully, as being liable to cut off by gastro-enteritis.

CANINE MADNESS — RABIES — (HYDROPHOBIA).—A specific disease supposed to arise spontaneously in the genus canis (dog, wolf, fox,) and in the cat, but transmissible by inoculation to all the domestic animals and to man. It is marked by disorders of intellectual, emotional, and nervous functions, altered habits, irritable temper, optical delusions, spasms of the muscles of the eyeballs and throat, paralysis, and more or less fever.

Causes.—Inoculation by bite is the usual (almost invariable) cause, yet cases manifestly arise spontaneously in most countries. Season, climate, abuse, privation of water, improper food, muzzling, etc., have no effect further than they serve to produce a febrile state and hasten the development of the disease when the seeds are already implanted in the system. A constantly increasing mass of testimony points to the conclusion that the restraint of an ungovernable sexual desire is one cause of the generation of the malady, and it is even supposed that the

maternal instinct has had a similar effect after the puppies have been removed. Males chiefly suffer, partly, no doubt, from their special liability to natural exciting causes, but mainly because the rabid dog is far more likely to bite a male than a female.

The poison is resident in the saliva and blood, but not in the milk. The saliva of rabid herbivora, omnivora, and men is equally virulent with that of carnivora, though in all animals it varies in intensity according to the stage of the disease. Of animals bitten by a violently rabid dog nearly all contract the disease, whereas among men the proportion is five to fifty-five per cent. This apparent immunity is largely due to the cleaning of the teeth on the dress before they reach the skin.

Incubation varies in dogs from five to eighty days, the majority showing symptoms thirty to forty days after the bite; in the horse fifteen to ninety days (usually thirty); in cattle twenty to thirty days; sheep twenty to seventy-four days; swine twenty to forty-nine days. In man it ranges about the same, exceptional cases extending over years, being manifestly instances of disease resulting from fear, a common occurrence in the human being.

Symptoms—In the Dog.—Any sudden change of habits, or instincts—dulness, restlessness, watchfulness, tendency to pick up and swallow straws and other small objects, constant desire to smell or lick the anus or generative organs of themselves or others, to lick a stone or other smooth, cold object, to rub the throat or chops with the fore paws, silent endurance of pain, rubbing or licking of a scar, the seat of the bite, liability to sudden passion and attempts to bite at sight of another dog or cat, may be looked on as very suspicious, if rabies exists in the country. Soon the characteristic howl is omitted. The voice is hoarse, low and muffled, and there is one loud howl, followed by three or four more successively diminishing in force and uttered without closing the mouth. Some dogs appear unusually fond of their owners and fatally inoculate them by licking their hands and face. Others turn the head and eyes as if following imaginary objects and snap as if at flies. Barking without object, a constant

searching, or tearing of wood, etc., to pieces, a seeking of darkness and seclusion and a disposition to resent disturbance, or a pilgrimage of several days' absence from home are among the most common precursors of the disease.

Furious Rabies.—Following some of the above symptoms there is a redness and fixed glare in the eyes, squinting, rolling of the eyes after fancied objects, more frequent howling, and increasing irritability with a tendency to worry all animals that come in their way, the respect for and immunity of former friends being lost in the violence of a paroxysm. The victim can no longer rest, but undertakes long journeys at a slouching trot, ready to fly at all that cross his path, especially if they make any noise or outcry. He may die during one of these journeys, or return dirty, careworn and sullen, with the rabid glare in his eye and ready to resent any interference. Each paroxysm of violence or wandering is followed by a period of depression and torpor proportionate to the preceding excitement, during which dark and seclusion are preferred, though any disturbance will arouse to violence. From the fourth to the eighth day paralysis sets in, first in the hind limbs, then in the jaw and the whole body, the certain precursor of approaching death.

Paralytic Rabies.—In this case paralysis with drooping of the lower jaw is shown at the outset, and gradually extends to the whole body. The animal cannot bite, eat, nor drink, rarely barks, and dies early.

Lethargic (Tranquil) Rabies.—Palsy of the jaw is less marked, but there is complete apathy, the patient remaining curled up in one position, and is not to be roused by any effort. He becomes daily more emaciated, and dies in ten to fifteen days.

In addition to these typical forms there are others holding an intermediate place. The furious form is especially common in bulldogs, hounds, and the less domesticated varieties, the paralytic and tranquil in the house and pet dogs.

Popular Fallacies.—I name these because of the evil

results of entertaining them. 1. Mad dogs have no *fear of water (hydrophobia)*. On the contrary, they swim rivers, plunge their noses in water, or lap their urine without hesitation. 2. *Appetite is not lost*, only depraved, and the stomach after death is found to contain an endless variety of improper objects. 3. There is rarely *froth at the mouth*, though saliva may run from it when the jaw is paralyzed. 4. The *tail is not carried between the legs* but is rather held erect during a paroxysm.

Foxes and wolves have symptoms like those of the dog, the animals losing their natural shyness or fear, and attacking man and beast indiscriminately. *Cats* attack with claws and teeth, flying at the face and hands, and utter hoarse loud cries, as in heat. The *horse* bites, kicks, neighs, draws his yard, rolls his eyes, jerks his muscles, and dies paralyzed. The mischievous propensity disquiets from delirium. The *ox* is restless, excitable, everts the upper lip, grinds his teeth, bellows loudly and as if in terror, scrapes with his fore feet, and butts and kicks all who approach. There is jerking of the muscles and finally paralysis. *Sheep* are similarly excited, show sexual appetite, stamp, butt and bleat hoarsely. They die paralytic. *Swine* are excitable, restless, grunt hoarsely, champ the jaws, bite intruders, tear objects to pieces, gape, yawn, become weak, and die paralytic.

Recoveries are so rare as to be extremely questionable.

Treatment.—This can only be warranted in the lower animals in hope of discovering a curative method for man, and then with extreme precautions, and in iron cages. Theoretically, vapor baths, with sulphites and antispasmodics (*datura*, *atropia*, *chloral-hydrate*, etc.,) would promise the best results. The boasted curative agents have all broken down when tried on well-marked cases in the lower animals, in which diseases of the imagination are not to be looked for.

Prevention.—When bitten, at once check the flow of blood from the part in the limb, by a handkerchief or cord with a piece of wood through it, twisted tightly around the member a little higher than the wound,—in other parts by sucking or by cutting open the wound to

its depth and squeezing or wringing, as if milking, to keep up a free flow of blood, soaking it meanwhile in warm water, if available. Drinking liquids to excess will also retard absorption. But as soon as caustics can be had apply them thoroughly to all parts of the wound, making sure that its deepest recesses are reached. The compression by handkerchief or fingers should not be relaxed until this operation is completed. A hot skewer, nail or poker serves admirably, and if at a white heat is less painful. But oil of vitriol, spirit of salt, nitric acid, caustic potassa or soda, butter of antimony, chloride of zinc, nitrate of silver, blue stone, copperas, indeed any caustic at hand should be at once employed. The wound should be thoroughly cauterized, though some time has elapsed since the bite, as absorption does not always take place at once.

All dogs should be registered, taxed, and furnished with a collar, bearing their own and their owner's names and that of their residence. During the existence of rabies in a country all dogs found at large unmuzzled should be destroyed. Suspected dogs should be shut up under supervision for three months, unless rabies is developed earlier. Dogs that have bitten human beings should be similarly shut up for a week to test the existence of the disease or otherwise.

MALIGNANT ANTHRAX.—A constitutional disorder, arising in rich, damp localities, in herbivora, swine and birds, and communicable by inoculation to other animals and to man. It shows itself by many different forms, all characterised by extreme changes in the chemical and vital properties of the blood, breaking down of the blood-globules, extravasations of blood or albuminous fluids in different parts of the body, with a tendency to gangrene, yellow or brown mucous membranes, enlargement or even rupture of the spleen (milt), and a very high mortality.

Causes.—It is propagated by *contagion* but tends to die out when produced in this way only. It is transmitted by contact with the blood, liquid exudations, portions of

the diseased carcass, fat, skins, hair, wool, bristles, feathers, and bowel evacuations, and rarely or not at all through the atmosphere. Simple contact of these matters with the healthy skin of a susceptible subject is enough to produce the disease. The virus is most potent when received from an animal still living or only recently dead, and yet may be preserved for months in all conditions of climate, temperature and humidity.

Eating of the flesh of animals killed while suffering in this way has often conveyed the disease in spite of the cooking to which it was subjected. Fifteen thousand of the inhabitants of St. Domingo once perished in six weeks from this cause, and a whole family was poisoned a few years ago in Aberdeenshire, Scotland. The Tartars perish in great numbers from eating their anthrax horses. Mosquitoes and other insects with perforating apparatus to the mouth probably help to communicate it, as nearly all cases in man occur on exposed parts of the body.

Its *development* in a locality is determined : 1. By the rich surface soil abounding in organic matter, and the impervious subsoil preventing natural drainage. 2. The frequent inundations of banks of rivers flowing through level countries and the drying up of ponds and lakes, leaving much organic deposit in their basins. 3. A continuation of warm, dry weather which favors organic emanations from such places as the above. 4. A condition of the system of the animal predisposing to the reception and growth of the poison, and consisting in the loading of the blood with plastic or waste organic matter, as in over-fed plethoric animals, in those making flesh most rapidly, in the young and rapidly growing, in those rendered unhealthy by overwork, impure air, unsuitable food or water. 5. Sudden chills when the poison is already present; hence extreme variations in the temperature of night and day. 6. A close, still atmosphere.

General characters.—In the typical cases the blood is black, tarry and incoagulable, and in all it shows broken-up globules, and microscopic rod-like bodies, and clear, refrangent spherules (bacteria) such as appear in putrefy.

ing liquids. The spleen, lymphatic glands and liver are enlarged, the mucous membranes of the stomach and intestines are usually reddened, thickened and softened, and any other part of the body may be the seat of bloody or albuminous effusion, with a tendency to death, decomposition, the extrication of gasses in the tissues, and a crackling sound when handled. When it commences in one point on the surface (malignant pustule) there is first an unhealthy eruption of minute blisters, which burst, dry up, and become gangrenous, while new blisters appear around as the unhealthy action spreads.

Divisions.—The malignant anthrax may be manifested by external disease, or swelling, or without such appearances. To the first class belong the carbuncular erysipelas of sheep and swine, malignant sore throat of hogs, gloss-anthrax or black-tongue, black-quarter or bloody murrain, the boil plague of Siberia, and the malignant pustule of man. To the second belong all those forms of the disease in which there are the specific changes in the blood, with engorgement of the spleen, blood-staining and exudations into internal organs, only.

Malignant Anthrax with External Lesions.

(A) IN HORSES.—(1) *Siberian Boil Plague.*—This is unquestionably an anthrax disease, and though named from Siberia is not unknown in other lands. A slight shivering and fever are followed by a swelling on the udder, sheath, breast, throat, or elsewhere, which rapidly increases sometimes to the size of an infant's head. At first soft, it hardens, assuming a yellow, bacon-like appearance, with red streaks and spots. The animals die in twelve or twenty-four hours, rarely surviving three days. The blood is in the state so characteristic of anthrax, with bacteria, enlarged spleen, and sanguineous effusions. In cattle similar tumors appear, mainly on the throat, neck, or dewlap, in sheep and goats on the bare surfaces, and in pigs around the throat. In all cases the disease, when conveyed to man, produces the *blue-pox* (malignant pustule). At the outset all cases prove fatal. Later recoveries occur under the local use of cold water, or the hot

iron or other caustics pushed to the depth of the tumor, and mineral acids internally.

(2) *Malignant Anthrax with Diffused Local Swellings.* *Typhus.*—This is usually confounded with the *purpura hæmorrhagica*, which is in no sense a contagious affection, but occurs in weak conditions of the body, as a sequel of debilitating diseases (influenza, bronchitis, pneumonia, etc.). Our limits forbid extended treatment, hence the general symptoms will be named, and the observer left to distinguish the two diseases according to their origin, communicability, and prevalence.

Symptoms.—Shivering, lassitude, stupor, impaired appetite, whitish discharge from the nose, accelerated pulse and breathing, costiveness with slimy dung or scouring, high-colored, odorous or bloody urine, swellings the size of a walnut or closed fist on different parts of the body, or a continuous swelling beneath the chest and belly, or extreme engorgement of the limbs or head. These are at first hot and tender, and easily indented with the finger, but soon become hard, the skin gets rigid and exudes drops of a yellow serum or pure blood. They may render the patient unable to walk, see, feed, drink, urinate, or breathe, according to situation. The mucous membranes become swelled, puffy, dusky or yellow, with red spots and streaks, and a viscid, bloody, and finally foetid discharge flows from the nose. Breathing may become labored and quick in connection with exudations into the chest, or violent colics may supervene from effusions in the abdomen. With internal effusions, death ensues in forty-eight hours; with external only, the effects may last for weeks or months before ending in recovery or death. In the latter case the swellings may suddenly disappear to reappear elsewhere, they may subside permanently in connection with free action of the bowels or kidneys, or they may slough, leaving extensive and sluggish sores and scars.

(11) *IN THE Ox.* — (1) *Black Tongue.* — *Also in the Horse.*—This is manifested by the eruption of blisters, red, purple or black, on the tongue, palate and cheeks,

increasing individually often to the size of a hen's egg, bursting, discharging an ichorous irritating fluid, and forming unhealthy sores with more or less tumefaction. There is a bloody discharge from the mouth, active fever sets in, and death ensues in twenty-four to forty-eight hours.

(2) *Black-Quarter*.—*Bloody Murrain*.—This is malignant anthrax, with extensive engorgement of a shoulder, quarter, neck, breast or side. It is most frequent in young and rapidly thriving stock, attacking first the finest of the herd or those thriving most rapidly, and runs its course so quickly that its victims are usually found dead in the field as the first indication of anything amiss. If seen during life there are the general symptoms of plethora, fever, with halting on one limb, stiffness, and excessive tenderness of some parts of the skin, to be promptly followed by swellings of such parts, with yellow or bloody oozing from the surface, and crackling when pressed. These swellings become firm, tense, insensible and even cold, and if the subject survives may finally slough open and leave large, unsightly and inactive sores. Recoveries are the exception, and too often slow and tedious.

(C) IN SHEEP—*Carbuncular Erysipelas*.—This strongly resembles black-quarter of cattle. Like that it attacks the finest of the flock and the bodies of its victims are found dead in the field. There is first halting on a limb, then a red or violet swelling beginning inside the leg and rapidly extending over the body. The feeling, appearance and course of the swelling agree with those of *black-quarter*, and death occurs in a few hours, or in exceptional cases in two days.

(D) IN SWINE.—These suffer from *Anthrax of the Mouth*, comparable to *black-tongue*, *carbuncular erysipelas*, like that of the sheep, *pharyngeal anthrax* and *tumors about the throat*, which sometimes at least have the anthrax characters.

(1) The *Carbuncular Erysipelas* has been constantly confounded in systematic veterinary works with *intes-*

tinal fever, but is a distinct disease, being derivable from other anthrax patients and communicable to other genera of animals and to man, whereas *kog-cholera* is absolutely confined to swine.

(2) *Malignant Sore-throat — Pharyngeal Anthrax.*—

This is perhaps the most frequent form of the disease in swine, often appearing to arise from eating the carcasses or excretions of other anthrax animals. There is active fever with redness and swelling of the throat, neck, breast and even the fore limbs. This is at first hard, elastic, warm and tender, but becomes purple, cool, insensible and pits on pressure. There is loss of appetite, retching, vomiting, purple patches and black spots on the eyes, snout and skin, difficult breathing through the mouth, livid tongue, decreasing temperature, great weakness and death in one or two days.

(3) In the *guttural tumors* the swelling is circumscribed to the size of a kidney-bean or egg, on one or both sides of the throat, extending to involve the throat generally, causing vomiting, difficult breathing and swallowing, the general symptoms of anthrax, and death from suffocation often under twenty-four hours. It attacks pigs of five or six months.

(E) **DOGS AND CATS.**—These suffer when they have eaten the carcasses of anthrax victims. The disease usually localizes itself in the mouth, throat and digestive organs, giving rise to bloody vomiting and purging, with high fever and often death.

(F) **BIRDS** suffer from the primary disease and more frequently from eating the debris of anthrax victims. In addition to the fever, characteristic swellings appear mainly on the comb, beak and feet.

(G) **MAN**—*Malignant Pustule.*—There is itchiness of the affected part, with a minute red spot, increasing in twelve or fifteen hours to the size of a millet-seed, bursting and drying with a livid appearance in thirty-six hours. Next day a new crop of vesicles surround the

seat of the first and pass through the same course to be succeeded by another and still wider ring. The whole is surrounded by a puffy, shining swelling, the central dry part passes through the shades of red, blue, brown and black, becomes gangrenous and insensible, and in case of recovery is sloughed off. At first the disease is quite local, but as it advances a violent fever sets in, which too often proves fatal.

Malignant Anthrax without External Swellings.

Apoplectic Form.—In all animals there is a form in which the victim is cut off after a few minutes' illness with or without discharge of blood from the natural openings of the body, and before time has been allowed for any of those changes in the blood and internal organs which characterise the disease. These are often to be distinguished from apoplectic seizures and sunstroke only by their occurrence simultaneously with other forms of *anthrax* and in the same places.

Anthrax Fever in Horses.—Vigorous health is replaced by dulness, muscular weakness, stupor, hanging on the halter, leaning on the side of the stall, if at work unsteady movement, colicky pains, lying down and rising, turning the head towards the flank. The hair is dry and erect, the hide tense, and may even crepitate on handling; it trembles or sweats about the ears, elbows or thighs. The eyes and nose assume a yellow or reddish or brownish-yellow tinge, with oftentimes dark red or black spots. The pulse is weak, the heart's impulse behind the left elbow strong, breathing labored or quick and catching. A frothy, bloody fluid may appear at the nose. The bowels are costive, the dung covered with mucus, or loose with streaks of blood. The rectum, everted, is of a dark red and puffy. Great weakness comes on and the patient dies in convulsions or during the subsequent calm. Death usually occurs in twelve to twenty-four hours.

Anthrax Fever in Oxen.—*Splenic Apoplexy.*—The patient ceases feeding and ruminating, or does so irregularly, trembles, has partial sweats, staring coat, varying heat of the body, arched back, quarters rested on the stall or

fence, or lies with the head turned to the flank. A high temperature (105° to 107°) precedes the outward symptoms by hours or days. The eye is sunken, dull, watery with the shades of brown and yellow, and dark spots remarked in the horse; breathing hurried, heart's action violent, pulse weak, loins and back tender or even crepitating, urine bloody, bloody liquids escape from nose, anus or eyes, and the dung is streaked with blood. As the disease advances the temperature of the body decreases and the patient dies in convulsions or quietude, or makes a rapid recovery. The fatal result usually takes place in from twelve to twenty-four hours.

Anthrax Fever in Sheep.—Blood-Striking.—Braxy.—Is very promptly fatal, the dead and already foetid carcasses being usually found in the morning, though the flock was apparently well at night. The black, tarry blood brightening very slowly on exposure, the enlarged spleen and mesenteric glands, the red, puffy, softened membrane of the bowels and the bloody and gelatinous exudations show the true nature of the disease. When seen during life there are signs of plethora, fever, red eyes, costiveness, bloody, mucous dung, bloody urine, colicky pains, unsteady gait, breathlessness when driven, flattened fleece, deep-sunken eyes, stupor, convulsions, and speedy death. Many cases of so-called braxy are not communicable to other animals, hence not genuine anthrax.

Anthrax Fever in Swine.—There are dulness, thirst, inappetence, a tardy, unsteady gait, hot, pendent ears, drooping tail, deep, dull brownish-red eyes, hurried breathing, small pulse, violent heart's action, and tense, tender abdomen. Nervous tremors, twitching or cramps come on, the body cools, bloody urine is passed, and sometimes bloody dung. Dark or black spots appear on the skin and mucous membranes, as in *hog-cholera*, and if the animal survives, these are sloughed off, often leaving sores. If swelling appears externally it is often a herald of improvement.

Anthrax Fever in Birds.—There is inappetence, ruffling of plumage, sinking of the head in the shoulders,

ætiâ diarrhœa, drooping, trailing wings, tenderness to the touch, muscular weakness, unsteady walk, inability to perch, livid or black comb and wattles. Sometimes the feathers drop off, and swellings appear about the head, throat or feet.

Treatment of Malignant Anthrax.

This is unsatisfactory, owing to the rapidly fatal action of the poison. The first cases usually die; the later ones may often be treated with fair success.

General Treatment.—In very plethoric subjects, bleeding may prove beneficial at the outset, but in advanced stages, in poor and weak subjects, and in those with feeble constitutions, like sheep, it is to be strongly condemned. Act on the bowels, kidneys and skin to eliminate the poison (sulphates of soda, or magnesia, acetate, nitrate, or tartrate of potassa, common salt, oil of turpentine). Sponge with cold water, and rub actively till dry. Rub with camphorated spirit or oil of turpentine. Give tonics (quinia, salacin, etc.), antiseptics (mineral acids, nitro-muriatic acid, tincture of the muriate of iron, chlorate of potassa, carbolic acid, bisulphite of soda, tincture of iodine, iodide of potassium, bichromate of potassa). In the Genesee outbreak of 1875 I had admirable results from the use of nitro-muriatic acid sixty drops, bichromate of potassa three grs., and chlorate of potassa two drachms, twice daily by the mouth, and two or three drachms of a saturated solution of sulphate of quinia, iodide of potassium and bisulphate of soda injected at equal intervals beneath the skin. Of fifty very sick oxen only four died.

In the advanced and weak conditions, stimulants (alcohol, turpentine, ether, valerian, angelica, camphor, etc.) are useful.

Local Treatment.—This is very successful with inoculated forms of the disease (malignant pustule, boil-plague, gloss-anthrax, malignant sore-throat), if employed before the poison has passed into the system and produced fever. For these, free cauterization and especially with antiseptic caustics (crystallized carbolic acid, the mineral

acids, chloride of zinc, chloride of iron, sulphate of iron or copper) is successful. But the whole diseased tissue must be reached, and in the case of the tongue the blisters must be first laid open and the agent applied in small quantity with a brush, or more freely in a diluted condition. In some external cases the hot iron is used with advantage. Such treatment may still be applied to circumscribed tumors accompanied by the fever, being followed by poultices to encourage suppuration.

For extensive engorgements use astringents (cold water, vinegar, etc.), weak antiseptic lotions, and, above all, injections with a hypodermic syringe of antiseptics (diluted tincture of iodine, diluted carbolic acid—1-100, etc.) The hypodermic treatment is equally applicable to the circumscribed tumors, but we must saturate their whole substance, otherwise absorption of the poison will lead to general disorder.

Prevention.—1. Drain the soil thoroughly. 2. When a soil cannot be drained, soil the stock in-doors or on other pastures rather than graze them. 3. Remove the stock from pastures known to be dangerous as soon as summer heat and dryness of the soil favor malarious emanations (late summer and autumn). 4. Shelter the stock at night and secure the shade of trees or sheds during the day, when, after a hot, dry season, there comes an extreme difference between the day and night temperature. 5. Secure abundance of pure water, avoiding such as is stagnant or putrid. 6. Keep always in good thriving condition, and avoid sudden accessions of plethora. Artificial feeding in dry times is often necessary to secure this, or in case of an over-luxuriant pasture, seclusion in a barn-yard for four or five hours a day. Sheep may be shut up on moonlight nights, to prevent feeding, in dangerous localities. 7. Overwork, exhaustion, close-aired buildings, ill-health, or whatever tends to load the blood with waste matter, should be avoided. 8. Exposed animals may have a little nitro-muriatic, sulphuric or carbolic acid daily in the water or food. 9. Diseased animals must be separated from the healthy. 10. Carcasses, secretions, dung, litter, etc., of diseased

animals should be deeply buried or otherwise perfectly destroyed. Buildings, yards, sheds, etc., occupied by the diseased should be thoroughly disinfected. Pastures should be abandoned for that season, and graves fenced safely from trespass for two years. 11. None but the attendants should approach the diseased. 12. Before handling, cauterize all raw sores on hands or face with lunar caustic, and wash the hands in a weak solution of carbolic acid both before and after. 13. Shut up all dogs, cats, and pigeons. 14. Never allow the flesh or milk to pass into consumption.

Glance
GLANDERS AND FARCY.—A specific febrile disorder originating in solipeds, and transmissible, by contagion or inoculation, to dogs, goats, sheep and men. *Glanders* is characterized by a peculiar deposit with ulceration on the membrane of the nose, and in the lungs, etc., and *farcy* by deposits of the same material and ulcerations of the lymphatics of the skin. Each has its *acute* and *chronic* form. The acute form usually results from inoculation, or in weak and worn-out systems. Besides the common cause—contagion, over-work, exhausting diseases, and impure air are especially injurious.

Symptoms of Acute Glanders.—Languor, dry, staring coat, red, weeping eyes, impaired appetite, accelerated pulse and breathing, yellowish-red or purple streaks or patches in the nose, watery nasal discharge, with sometimes painful dropsical swellings of the limbs or joints. Soon the nasal flow becomes yellow and sticky, causing the hairs and skin of the nostrils to adhere together, and upon the mucous membrane appear yellow elevations with red spots, passing on into erosions and deep ulcers of irregular form and varied color, and with little or no tendency to heal. The lymphatic glands inside the lower jaw, where the pulse is felt, become enlarged, hard and nodular, like a mass of peas or beans, and are occasionally firmly adherent to the skin, the tongue or the jaw-bone. The lymphatics on the face often rise as firm cords. An occasional cough is heard, and auscultation detects crepitation or wheezing in the chest. The ulcers

Symptoms of Chronic Glanders.—This is characterized by the same unhealthy deposits and ulcers in the nose, varying extremely in size and number, often, indeed, situated too high to be seen; by the same viscid discharge, but usually much less tenacious than in the acute form; by the same hard, comparatively insensible nodular glands on the inner side of the jaw-bone; and a cough, which, however, is much more rare. Excepting at the very outset, the animal usually appears to be in the best of health, with the apparently insignificant drawback of the nasal discharge, and hence he is often kept and used till he contaminates a number of horses or even men. The case is easily recognized, unless where the ulcers are invisible or the enlarged glands removed. It is sometimes needful to inoculate a useless animal to decide as to the nature of the malady. It usually proves fatal to the inoculated animal in about ten days.

Symptoms of Acute Farcy.—The premonitory symptoms resemble those of acute glanders, of which it is but another manifestation. The local symptoms consist in thickening of the lymphatic vessels, which feel like stout cords, painful to pressure; and the formation of rounded inflammatory swellings (farcy-buds) along the course of these corded lymphatics. There follow ulceration of these buds, raw sores, discharging a glairy, unhealthy pus, and dropsical engorgement of the limb or other part affected. It is usually seen to follow the line of the veins on the inner side of the hind or fore limb, but may appear on any part. The cording usually extends from the feet towards the body, and is most likely to be confounded with *lymphangitis*, in which the swelling begins high up in the groin. It usually proves fatal, becoming complicated with glanders before death.

Symptoms of Chronic Farcy.—This may follow the

acute form or come on insidiously. First there is some swelling of a fetlock, usually a hind one, and a round, hard, nut-like mass may be felt, which gradually softens, bursts, and discharges the characteristic serous or glairy matter. The lymphatics leading up from it meanwhile become corded, and farcy-buds appear along their course. Or the round, pea-like buds appear first on the inner side of the hock, or on some other part of the body, soften, burst, and discharge before any cording of the lymphatics can be felt.

By-and-bye dropsical swellings appear in the limbs and elsewhere, at first soft and removable by exercise, later, hard and permanent. Sometimes the farcy-buds fail to soften, but remain hard and indolent for months.

Glanders in the dog is a comparatively mild affection, but as deadly if it is conveyed back to the horse or to man. *Glanders in man* presents the same general symptoms as in the horse, and need not be further described.

Treatment of Glanders.—The acute disease is fatal. The chronic form occasionally appears to recover, though more commonly the symptoms are covered up, to reappear whenever the animal is put to hard work. The treatment of glanders in all its forms, and of acute farcy with open sores, should be legally prohibited because of the danger to man as well as animals.

For glanders the most successful agents have been arseniate of strychnia (5 grs.), bisulphite of soda (2 drs.), biniodide of copper (1 dr.), cantharides (5 grs.) with vegetable tonics, sulphate of copper (6 drs. in mucilage), sulphate of iron (4 drs.), chloride of barium, copaiva, cubebs, etc. Pure air and rich food are perhaps even more important. To the nose may be applied sulphur fumes, fumes of burning tar, carbolic acid solution in spray, etc. The enlarged glands may be treated with astringent solutions, and later with iodine injections, or may even be excised with the knife.

Treatment of Chronic Farcy.—Active local inflammation may demand purgatives (aloes), diuretics (iodide of potassium), with warm fomentations or astringent lotions, exercise, and a soft non-stimulating diet. In the absence

furcin?

of such indications use the tonics advised for glanders, choosing in the order named. The corded lymphatics and unbroken farcy-buds may be blistered or rubbed with iodine or mercurial ointment. The raw sores should be treated with caustics (carbolic acid, nitrate of silver, corrosive sublimate, chloride of zinc, or even the hot iron). Use iodine, diuretics, exercise, rubbing, etc., to reduce the swelling, and feed liberally.

Prevention.—1. Destroy all glandered horses, and all with acute farcy and open sores, and bury deeply. 2. There should be a high penalty attached to the exposing of glandered horses in public places. 3. Suspected animals should be secluded under veterinary supervision until they can be pronounced sound, or destroyed. 4. The stable, manure, litter, harness, clothing, utensils, etc., with which the disease has come in contact, should be thoroughly disinfected. 5. Neither strange animals nor men should be admitted, and attendants should disinfect before leaving. 6. Horses should be protected as far as possible from exhausting work, chronic, wearing-out affections, and above all, impure and rebreathed air.

VENEREAL DISEASE OF SOLIPEDS.—This is a curious disease of unknown origin, existing in Arabia, North Africa, and Continental Europe, bearing a strong resemblance in many points to Syphilis, and propagated by copulation. I name it here because of the probability of its importation with European or Arabian horses.

Symptoms.—From one to ten days after copulation, or in the stallion sometimes after some weeks, there is irritation, swelling, and a livid redness of the external organs of generation, (in stallions the penis may shrink) followed by unhealthy ulcers, which appear in successive crops, often with considerable interval. In mares these are near the clitoris, which is frequently erected, with switching and rubbing of the tail; in horses, on the penis and sheath. In the milder forms there is little constitutional disturbance, and the patients recover in a time varying from a fortnight to two months. In the severe forms the local swelling increases by intermittent

steps. The vulva is the seat of a deep violet congestion and extensive ulceration, pustules appear on the perineum, tail and between the thighs, the lips of the vulva are parted, exposing the irregular, nodular, puckered, ulcerated, and lardaceous-looking mucous membrane, abortion ensues, with emaciation, lameness, paralysis, and death after a wretched existence of five months to two years. In horses, swelling of the sheath may be the only symptom for a year, then there may follow dark spots of extravasated blood, or swellings of the penis, the testicles may swell, a dropsical engorgement extends forward beneath the abdomen and chest, the lymphatic glands in different parts of the body may swell, pustules and ulcers appear on the skin, the eyes and nose run, a weakness and vacillating movement of the hind limbs gradually increases to paralysis, and in a period varying from three months to three years death puts an end to the suffering.

It is needless to speak of treatment. Should this disease ever reach America it ought to be stamped out at once, as its insidious nature would enable it to spread to the great destruction of stock.

TUBERCULOSIS, CONSUMPTION, PINING.—This is a hereditary constitutional affection, characterized by a specific deposit of cells, large and small, in a special network, but without blood-vessels. It is situated by preference in the groups of lymphatic glands, or in the microscopic gland-like tissue of the different organs, and may be seen in all stages from the simple redness and congestion in which the deposit is only commencing, through the solid grayish tubercle to the soft yellowish, cheese-like mass resulting from the softening of the latter. There are also the open cavities resulting from their rupture and the discharge of the tuberculous matter, and chalky masses from the deposit of earthy salts within them. They may be no larger individually than a millet-seed, or in the chest of cattle one may measure a foot long and five or six inches in thickness. They are most common in cattle, especially heavy milkers.

with long legs, narrow chest, attenuated neck and ears and horns set near together. Sheep and swine with a corresponding conformation are next in order of liability, while horses, dogs, and fowls are comparatively exempt. Oft-repeated experiment has shown that tubercle is communicable to healthy animals by inoculation, or by eating the raw, diseased product, and that it is superinduced in any predisposed individual by setting up a local inflammation. It has also been transmitted by the warm, fresh milk, but probably only when the disease has invaded the mammary glands; in many experiments, including those conducted by the author, the milk has proved harmless. Close, badly-aired buildings (as town cow-sheds), are among the most prolific causes of the disease, as are also changes to a colder climate, to a cold, exposed locality, or from a dry to a low, damp, undrained region. Finally, any cause which tends to wear out the general health tends to tuberculosis in a predisposed subject.

Tubercles may be developed in any part of the body, as the lungs, their serous covering, the membrane supporting the bowels, the coats of the intestines, the throat, the spleen, the liver, the pancreas, the ovaries, the kidneys, the bones, especially the ends of long bones, and in rare cases, the muscles and connective tissue.

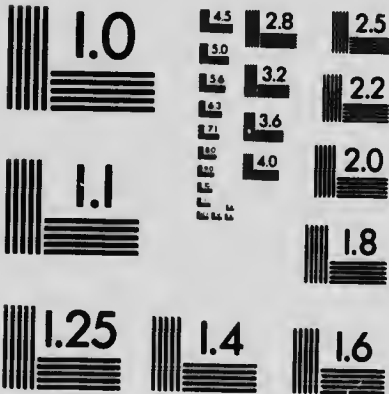
Symptoms vary according to the seat of the deposit, yet there is a constitutional condition common to all, and the lungs are almost always involved in the later stages, giving rise to a great similarity of symptoms. The disease may be acute, but is usually chronic. The onset is insidious and easily overlooked, tubercles being often found in animals killed in prime condition, and I have seen them in *parturition fever*, which is always attributed to plethora. There is some dulness, loss of vivacity, tenderness of the withers, back, and loins, and of the walls of the chest, occasional dryness of the nose, heat of the horns and ears, want of pliancy in the skin, slightly increased temperature (102°), weak, accelerated pulse, mawkish breath, stiffness of the limbs, wandering perhaps from one to another, slight, infrequent. dry

cough, and blue, watery milk, often abundant with cheesy matter, fat and sugar decreased and soda and potassa in excess. The lymphatic glands about the throat are often manifestly enlarged. Swellings of the joints may appear, or a murmur harsher than natural may be heard over the lower end of the windpipe or in the chest. With deposits in the abdomen and especially in or near the ovaries of cows the desire for the male is often constant (*bullers*) though conception and the completion of gestation are usually impossible. Working oxen are easily overdone and become visibly emaciated from day to day. As the disease advances the eyes sink in their sockets and lose all animation, the skin is hidebound, harsh, dry, and scurfy, the hair dull, dry, and erect, the membranes of the eyes, nose and mouth of a pale, yellow, bloodless aspect, though often streaked with pink vessels, a whitish discharge often takes place from the nose, and with it an increased repulsiveness and often distinct fœtor of the breath; if the bowels are involved, scouring is common, and if the bones, swelling and lameness increase. Exhaustion, with profuse perspiration and labored breathing, occur on the slightest exertion, the appetite fails, tympany follows each meal, and the milk is at once poorer and lessened in quantity. The cough increases, becomes rattling, the discharge profuse, fœtid, mixed with cheesy-like or chalky particles, crepitating, wheezing, gurgling, and other abnormal noises are heard in the chest, and percussion shows dulness in particular parts with wincing. All of the symptoms become steadily aggravated and the animal usually perishes from the difficulty of respiration or the profuse fœtid diarrhœa. In cases affecting the bones, the patient may be unable to stand, and the bony prominences may make their way through the skin, or even crumble under the pressure thrown upon them. If the tubercle is deposited in liver, pancreas or kidneys, there are symptoms of disease of these respective organs.

Recoveries sometimes ensue in connection with healing of vomicae or calcification of the tubercles in strong



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subjects, but more frequently the disease progresses to a fatal issue.

Treatment.—This is unsatisfactory as being rarely successful, and even then in preserving an animal which is dangerous as a breeder for producing a progeny predisposed to this disease, and for slaughter and dairy purposes, as possibly conveying the malady to man.

The most promising course is to secure dry, pure air, sunshine, a genial temperature, rich and easily digestible food, containing abundance of fat (linseed, corn, beans, peas, potatoes,) a course of tonics (linseed or cod-liver oil in small doses, sulphate of iron, hypophosphite of iron, quinia, gentian, etc.,) and antiseptics, (fumes of burning sulphur, bisulphite of soda, sulpho-carbolate of iron, etc.)

Prevention.—This would include drainage, shelter of pasture by trees, avoidance of changes to cold or damp localities, a warm sunny location for farm buildings, suitable feeding and watering, the prevention and cure of all debilitating, and especially chronic diseases, protection against overwork, or excessive secretion of milk on a stimulating but insufficiently nutritious diet, securing young, undeveloped animals against breeding and milking at the same time, rejection of tuberculous subjects from breeding, the prompt removal of all such animals from pastures or buildings used for the healthy, and the thorough disinfection of all places where they have been kept.

The flesh and milk of tuberculous animals are always to be viewed with suspicion, but this poison, like others, can be destroyed by the most thorough cooking.

CHAPTER III.

PARASITES.

Parasites—their numbers. Tapeworms. *Tænia Cœnurus*. *Cœnurus Cerebralis* and their Effects, Staggers, Turnsick, Gid, Sturdy, Water-brain in Calves and Lambs. *Tænia Echinococcus*, *Echinococcus Veterinorum* (Hominis), *Echinococcus* disease. *Tænia Solium*. *Cysticercus Cellulosa*, Parasitic Measles in Swine. *Tænia Mediocanellata*, *Cysticercus Mediocanellata*, Parasitic Measles in Cattle. *Tænia Expansa*, Tapeworm in Sheep and Cattle. Lard Worm, Kidney Worm of Hogs. *Eustrongylus Gigas*, Kidney Worm. *Trichina Spiralis*, Trichinosis.

PARASITES.—The domestic animals harbor no less than two hundred species of parasites which will be found treated in the author's larger work, but the limits of the present book will restrict us to a few of the more injurious. For convenience of reference most of these are noted in connection with the organs (skin, bowels, liver, air-passages,) which they infest, and here we will only name such as having a more general diffusion through the body cannot well be referred to any one organ.

TAPE-WORMS.—These are flat-bodied worms made up of small segments joined end to end, and when full grown varying in length from one inch to one hundred feet. The narrow end terminates in a small globular head furnished with circular sucking discs, and a proboscis usually encircled by one or more rows of hooklets. From the other end the ripe segments are continually detached and expelled from the body, and may be recognised as little, white, flattened, oblong objects progressing over soil and vegetables by a worm-like movement, and depositing an endless number of microscopic eggs with which they are literally filled. Some tape-worms are estimated to lay as many as 25,000,000 eggs. Taken with the food or water into the body of a suitable host,

these eggs open and set free an ovoid six-hooked embryo, which bores its way through the tissues until it reaches that organ or tissue which is the natural habitat of its species in the young or larval state and there encysts itself. It may survive indefinitely or even die in this situation, or if its host is eaten by a carnivorous animal it may develop in its bowels into a mature tapeworm and reproduce its species as before. Fortunately nearly all the eggs perish from failing to be taken into the body of a suitable animal in which they can develop into the cystic form, or this peril escaped, because the first animal host is not devoured by the right species of animal in which the young cystic worm can grow into its mature tape-worm form. But from the enormous fecundity of these tape-worms in eggs it is manifest that there may be scarcely any limit to their increase when the different animals which form their hosts in the cystic and mature condition abound together in the same locality.

STAGGERS—TURN-SICK — GID—STURDY—WATER-BRAIN IN LAMBS AND CALVES.—A tapeworm of the bowels of the dog, of one to three feet long, has its *cystic form* in the brain and spinal cord of sheep and cattle, giving rise to nervous disease, varying much in character, according to the exact site of the cyst.

Symptoms.—Great nervousness and fear without apparent cause, or dulness, stupor and aberration of the senses, and disorderly muscular movements. The sheep is found apart from the flock with red eyes, dilated pupils, blindness and unsteady gait, but with a tendency to move restlessly in one direction. Left to itself, it neglects to eat or drink, and wastes daily. But, if well-fed and excitement avoided, it may even gain flesh. If the cyst is situated on one side of the brain, the lamb turns to that side, moving in a circle and making a beaten track. The limbs on the opposite side of the body act in a disorderly manner, being partially paralysed. If there is one on each side of the brain, the sheep will turn to one side or the other, according to the relative activity

STAGGERS—TURN-SICK—GID, ETC.

of the parasites at any given moment. When the cyst is directly in the median line, the sheep elevates its nose and advances in a straight line until stopped by some obstruction. When located in the back part of the brain, (cerebellum), the host lifts its limbs in a jerking, uncertain manner, sets them down in a hesitating way, stumbles perpetually, falls and struggles for some time ineffectually in its efforts to rise. If situated in the spinal cord, difficult breathing and paralysis are marked symptoms. The disorders are often extreme at first, and afterwards undergo a temporary improvement, the remissions and aggravations being probably due to the varying activity of the parasite at different periods. Simple tumors, maintaining a steadily increasing pressure rarely give rise to such intermittent symptoms.

The cœnurus mostly affects sheep under two years old and those that are out of condition. Yet the finest animals, kept for show, will sometimes suffer. So it is in cattle, the young, weak and ill-thriven are the most exposed, but all may suffer. For the same reason, poor, damp and exposed localities suffer more than the rich, dry and sheltered.

Prevention.—Destroy the dogs, or, if they must be kept, deny them sheep's heads until cooked. Examine them at frequent intervals and expel all tape worms by vermifuges, (oil of turpentine, male-fern, kousso, areca nut, etc.) Keep the young sheep at all times in good, thriving condition. Drain all wet pastures, shelter exposed ones.

Treatment.—In rare cases, spontaneous recovery may follow rupture of the cyst in connection with a blow on the head or a fall. Hogg passed a long knitting wire through the nose into the brain, and Youatt advises a small trocar for the same purpose. But the cyst is more easily punctured and extracted through the upper part of the skull. In advanced cases, the internal pressure of the cyst has sometimes caused absorption of the bones and the formation of a soft spot on the upper part of the skull. This should be laid open with a sharp lancet or penknife, just enough to introduce a trocar and cannula

one-eighth inch in diameter, through which the liquid may escape slowly. The animal may be turned on its back to complete the evacuation, but held firmly so that no struggling can take place. As the cyst is emptied, a membrane will be found projecting through it, and should be slowly drawn out. This is the parasitic cyst, and from its inner surface will be found projecting one hundred to two hundred little elevations like pin-heads, each representing the head of a tape-worm and being capable of development into the mature parasite if swallowed by a dog. The wound should be covered with a pitch plaster and a leather hood, and the patient placed in a dark, quiet, secluded box, on soft, laxative diet for a week.

If the bones are not softened the point to be perforated must be ascertained from the symptoms. If the sheep turns to one side, open a little in front of the corresponding ear, and about half an inch from the median line of the skull. If the head is elevated and the walk straight forward, without much terror or disorderly movement, open at the same level but in the median line. If there is awkward, hesitating movement, much terror, flurry and stumbling, open in the median line further back. A flap of skin is to be dissected up from the bone, large enough to admit a trephine one-eighth inch in diameter (in an emergency a gimlet will do), with which the bone is to be perforated. After this the cannula and trochar is used as above advised.

If more than one cyst should be present the operation may require repetition, and with care recoveries often ensue.

TAPE-WORM OF DOGS.—A tape-worm of the dog, not exceeding one inch in length, lives in its cystic form in the most varied internal organs of men and animals. As the cystic form of this parasite has the power of increasing its numbers almost indefinitely, and growing into enormous multilocular cysts, it becomes extremely injurious and even deadly to its brute, and, above all, to its human victims. One-sixth of the human mortality in Iceland has been attributed to this parasite,

and a fatal case in a child has recently come under my notice in Tompkins Co., N.Y. Many of the cysts of water found in the liver and other internal organs of the domestic animals are specimens of *echinococcus*, and that they are not more frequently fatal may be attributed largely to the shortness of the lives of the animals raised for slaughter. They may inhabit almost any organ (liver, lungs, spleen, abdominal walls, kidneys, brain, eye, etc.,) and the symptoms will vary accordingly.

Treatment.—Spontaneous recovery may take place from death or rupture of the sac. Otherwise the true nature of these fluctuating tumors can rarely be recognized, but if they should, they may be punctured with a very fine needle-shaped nozzle, the liquid evacuated with a syringe, and compound tincture of iodine injected into the sac.

Prevention.—Destroy all superfluous dogs. Keep others from slaughter-houses, and deny raw flesh, and especially offal. Examine frequently, and if segments of tape-worm are passed clear them away with vermifuges (see *gid*). Burn the dung of all dogs suffering from tape-worms, the contents of evacuated hydatids and all offal containing cysts.

MEASLES IN SWINE.—The bladder-worm of pork is the immature form of the tape-worm of man, and is only caused by pigs having access to human excrement, or to places near privies, etc., from which the segments of the human tape-worm may travel. The cysts, respectively about the size of a grain of barley, are found in the muscles, in the loose connective tissue between them, and under the skin, in the serous membranes, in the eye, under the tongue, in the brain, etc., of swine. They are also found in the undeveloped form in the muscles, brain, etc., of man, causing disease and death. To man the parasite is usually conveyed by eating underdone pork, or in the cystic form he receives it as the egg in his food (salads, etc.,) and water.

Symptoms.—In pigs the cysts can usually be seen under the tongue or in the eye. In man there are the

general symptoms of intestinal worms and the passage of the ripe segments. Other symptoms may attend the presence of the cysts according to the organ which they invade. Thus when passing into the muscles there are pains and stiffness resembling rheumatism; when into the brain, coma, stupor, imbecility, delirium, but when they have once become encysted they may continue thus indefinitely without further injury.

Treatment.—The cysts scattered through the body are beyond the reach of medicine.

Prevention.—Human beings harboring tape-worms should be compelled to take measures to expel them. Their stools should be burned or treated with strong mineral acids. Swine should be kept apart from all deposits of human excrement; no such manure should be used as a top-dressing on pasture open to swine, or on land (market gardens, orchards, etc.,) devoted to the raising of vegetables to be eaten raw. Avoid raw meat, especially pork, even if salted and smoked, and underdone meat and sausages, also well-water from gravelly soils in the vicinity of habitations.

MEASLES IN CATTLE.—This consists in the presence in the muscles of cattle, especially young ones, of a cystic parasite, two to four lines in length, which as a mature tape-worm, inhabits the human bowels. When the eggs were given experimentally to calves, they caused stiffness, wasting and death in three weeks. Or improvement began at the end of a fortnight. Terminated in apparent recovery, the live cysts remaining in the muscles and ready to develop into their adult form when eaten by man.

Under *prevention* and *treatment* might be repeated what is stated under *measles of swine*, merely substituting the word cattle for pigs. The current practice of eating raw beef ham is especially reprehensible.

TAPE-WORM OF SHEEP AND CATTLE.—*Tania Expansa* is the name of this worm, which causes great loss in some localities in America, as well as in Australia.

Germany, etc. Its cystic form is unknown, therefore we can only check its increase by watching what sheep pass the ripe, detached segments, shutting them up, expelling the worm by vermifuges (oil of turpentine in milk, male-fern, etc.,) and burning both it and the sheep's droppings.

LARD-WORM OF THE HOG.—This worm is from one to one and three-fourths inches long by one-thirteenth inch broad, and is found in almost all parts of the body of swine. It is frequent in the liver, kidneys, and the fat about the spare-rib, but has been found in the air-passages, the heart, the veins, the mesentery, and elsewhere. In many cases, no impairment of the health is observed. But irritation of important organs like the kidney or liver may lead to weakness of the hind parts, diarrhœa, or even blood-poisoning and sudden death. It seems not improbable that the attack of this worm in the liver may produce a disorder which is confounded with *Hog Cholera*. Its presence in the kidney may sometimes be recognized by the existence of microscopic eggs in the urine. But without the observation of such eggs weakness of the hind parts cannot be ascribed to the *kidney-worm*.

Treatment is unsatisfactory. Small doses of salt and oil of turpentine may be given with no great hope of success. The favorite dose of arsenic only escapes killing the hog because he rejects it by vomiting. If beneficial at all it must be taken in small doses, one-eighth to one-sixth grain, so that it may be taken up into the system.

Prevention is to be sought by keeping the healthy and diseased apart, and especially by raising young pigs apart from the ground occupied by the old.

TRICHINA SPIRALIS.—This worm, which is capable of being reared in all the domestic animals, is especially common in man, the hog and the rat. Trichinæ are almost microscopic, varying from one-eighteenth to one-sixth inch in length, yet they are among the most deadly worms known. The mature and fertile worm lives in the intestines of animals, the immature in minute cysts in

the muscle. The latter can only reach maturity and reproduce their kind when the animal which they infest is devoured by another, and they are set free by the digestion of their cysts. When thus introduced into the bowels they grow and propagate their kind, giving rise to much irritation for the first fortnight, *diarrhœa*, *enteritis*, or *peritonitis*. The symptoms caused by their boring through the bowels and into the muscles last from the eighth to the fiftieth day. There are violent muscular pains like rheumatism, but not affecting the joints, a stiff, semi-flexed condition of the limbs and sometimes swellings on the skin. In man the affection is often mistaken for rheumatism or typhoid fever; in the lower animals the symptoms are usually less marked, but are the same in kind. There are loss of appetite, indisposition to move, pain when handled, and stiffness behind. If the patient survives six weeks recovery may be expected, because the worms no longer irritate after becoming encysted in the muscle.

Treatment.—In the first six weeks, but especially for the first fortnight, use laxatives and vermifuges. Glycerine, benzine, Düppel's animal oil, chloroform, alcohol and picric acid are fatal to them in about the order named.

Prevention.—Never eat underdone meat. *Trichina* survive 140° F. Hams thoroughly smoked are safe. Slightly-smoked hams and those steeped in creosote or carbolic acid are most dangerous. Pigs should not be kept near slaughter houses, and especially should the waste of these places be forb. en them. Such hog-pens, indeed all piggeries, should be kept scrupulously clean and clear of rats and mice. The carcasses of swine fed near slaughter-houses or where rats abound should be subjected to a thorough microscopic examination before passing into consumption. Wherever a case of trichinosis occurs in a human subject the pork should be traced to its source if possible, and the pigs reared in the same place killed and subjected to long boiling. The rats and mice should be eradicated and the hog-pens and manure burned.

CHAPTER IV.

DIETETIC AND CONSTITUTIONAL DISEASES.

Ergotism. Goitre. Rheumatism. Acute Anasarca. Purpura
Hæmorrhagica. Anæmia.

ERGOTISM.—From time immemorial animals and men have suffered from eating the cereal grains which have been attacked with ergot. This was especially the case when agriculture was in its infancy, for then a damp cloudy season would cause this affection to spread after the manner of a plague. The same holds still to a less extent, and in the New World as well as the Old. Not only the *ergot* but even the *smut* of maize will bring about untoward effects. These results may be divided into three categories according as the poison acts on the *brain* producing *convulsions*, *paralysis* or *profound lethargy*; or the *womb* tending to *abortion*; or on the extremities causing *dry gangrene*.

Symptoms of the Nervous Form.—Unsteady gait, a great tendency to lie down and to remain in a torpid state little conscious of what is passing around, loss of lustre of hair or feathers, coldness of skin, dilatation of the pupils of the eyes, and dulness of the special senses, mark the early stages. This may go on to paralysis or deep lethargy without an active nervous excitement. Or paroxysms supervene, during which the special senses become more acute, the animal very excitable, and twitching of the muscles or spasms like those of lockjaw or epilepsy convulse the patient. Then there is a relapse into the former stupor and drowsiness, with palsy of the hind limbs or knuckling forward at the fetlocks. Death may ensue in a few hours or days, or the affection may become chronic, the patient remaining with variable appetite, but getting no good of his food, with spasms of

the pharynx, vomiting or diarrhoea. He usually passes off in a convulsion.

Symptoms of the Abortion Form do not differ from those of abortion from other causes. (See *Abortion*).

Symptoms of the Gangrenous Form.—Nervous symptoms may or may not usher in the disease. Then follow swelling, heat and tenderness of the extremities, usually the hind feet but sometimes the fore, or the tail, ears, or roots of the horns. Lameness usually first draws attention to this condition. Soon the extremity becomes cold, insensible, of a deep brownish-red appearance and dry, hard, or almost horny. The swelling, heat and tenderness persist higher up, but the lower part is dead, including even the bone up to a given point. At this level a red, circular crack appears in the skin separating the dead from the living, and if the patient should survive long enough the whole gangrenous part drops off.

It usually occurs in winter from the dry hay fodder, but is distinguished from frost-bite by implicating the deep as well as the superficial parts, and attacking the feet in preference to the more exposed tail and ears.

Treatment is only successful in the mildest cases, and the earliest stages. Change to wholesome diet, including plenty of roots or potatoes. Clear offensive matter from the bowels by laxatives, and give tonics (cinchona, gentian,) stimulants (ammonia, valerian, angelica, musk,) and antispasmodics (opium, chloral-hydrate, chloroform, or nitrite of amyle). Use soft, warm poultices containing camphor.

Prevention.—Ergoted hay, known by the black, spur-like growths out of the husks, should be withheld, or fed only in limited quantity in conjunction with roots and potatoes. Be careful in selecting seed clear of ergot. Seed may be protected to a large extent by sprinkling with a strong solution of blue-stone or bisulphite of soda before sowing, and drying with quicklime. Contaminated soil should be used for other crops. Drainage and open sunshine are conducive to healthy growth. Hay from affected pastures must be cut early, before it has run to seed.

GOITRE.—This is a diseased enlargement of the *thyroid body*, situated beneath the throat, and is common in animals and in man wherever the water is charged with the products of magnesian-limestone. Hence its frequency on the limestone formations of New York, Pennsylvania and parts of Ontario. Weakness from any disease, poor feeding, abuse, over-work, etc., aggravates the affection. In solipeds there are two distinct swellings, one on each side, but in other animals, and, above all, in swine the swelling is single and in the median line. At first it is soft and even doughy, but afterwards it is firm, tense and resistant, and if cut into may even be gritty. In lambs it may form a great enlargement from the jaw to the breast-bone, and the whole produce of the year may be still-born or die soon after birth.

Treatment.—Give rain-water and use iodine freely, both internally, on an empty stomach, and over the swelling. Persist in this for months. Weak solutions of iodine may be thrown into the tumor by a hypodermic syringe, or the nutrient blood-vessels may be tied.

The destruction of lambs by goitre may be obviated by giving the ewes rain-water, good-feeding and plenty of exercise in the open air during the winter.

RHEUMATISM.—This is a peculiar form of inflammation attacking the fibrous structures of the body (muscles, tendons, joints, bursæ, etc.,) and dependent on a constitutional predisposition transmitted from parent to offspring. It often shifts from place to place, rarely results in suppuration, and shows a great tendency to implicate fatally the valves and other fibrous structures of the heart. Besides the constitutional predisposition, it owes its development to accessory causes, such as cold and wet, cold draughts, and disorders, especially those of the digestive and respiratory organs, which load the blood with abnormal and probably acid elements.

Symptoms.—Acute Form.—Dulness, languor or indisposition to move, followed by extreme lameness in one or more limbs, and heat, swelling and tenderness of a joint, tendon or group of muscles. If this tenderness

moves from joint to joint or muscle to muscle it is very characteristic. The swelling is at first soft and afterwards hard and resistant ; it may fluctuate from excess of synovia in a joint, but rarely from the formation of matter. With the onset of the inflammation comes active fever, with full, hard pulse, increased temperature, hot, clammy mouth, dry muzzle, hurried breathing, costiveness, and scanty, high-coloured urine, sometimes with a neutral or even acid reaction. Cattle often remain down and refuse to rise. If the disease extends to the heart, the pulse has a sharp, often intermittent or irregular beat, and one or other of the heart sounds may be accompanied by a hissing or sighing murmur. (*See diseases of the heart.*)

Chronic Form.—This resembles the acute, excepting that it is less severe, usually unattended by fever, and may even appear only on exposure, and disappear in the warm sunshine. It is liable to induce fibrous and even bony enlargements, and in cattle suppuration, especially about the joints, and in such cases the disease is more stable and less inclined to shift from place to place.

Treatment.—Give a laxative (horse, aloes ; ox or sheep, Epsom salts ; pig or dog, castor oil,) with anodynes (opium) if pain is extreme, and follow up with alkalies (bicarbonate of potassa or soda ; acetate of potassa or ammonia ; cream of tartar,) and diuretics (colchicum, muriate of ammonia, nitrate of potassa). Sudorifics (hot room ; warm clothing ; rugs rung out of boiling water closely applied to the skin, and covered with dry ; bags of dry grain, bran or sand ; rubbing with hot smoothing irons over a thin covering ; hot air or steam baths ; aconite ; acetate of ammonia ; guarana, etc.,) are in the highest degree beneficial. Some agents, like propylamine and muriate of iron, have been very serviceable in certain hands. Local treatment consists in the application of warmth, etc., as above indicated, and also blisters (strong aqua ammonia and olive oil), which may be applied several times a day, and the inflammation followed up as it recedes from structure to structure.

ACUTE ANASARCA.—PURPURA HÆMORRHAGICA.—The affection to be described here is altogether different in its nature from the dropsies which result from the obstruction of veins, in phlebitis, or because of pressure by a diseased structure, as also from those dependent on suppression of the secretion of the urine, on heart-disease or a watery state of the blood with deficiency of blood globules. It is not at all inflammatory, nor of the nature of malignant anthrax, as is generally assumed. It is exceedingly common after influenza and other affections of the respiratory organs, in ill-ventilated stables, where animals are compelled to use rebreathed air, and in very open cold barns, where they are liable to be chilled after being heated at work. Sudden excessive lowering of temperature or exposure to cold rain or wind storms, especially when hot and perspiring, are efficient causes by reason of the sudden check to the secretions of the skin. The disease is much more frequent under the extreme vicissitudes of temperature of Canada than in the more equable climate of the British Isles.

Symptoms.—The disease is manifested abruptly by appearance of tense, painful, rounded or diffuse swellings on the nose, lips, face, neck, inner sides of the limbs, belly, or, indeed, anywhere over the body. These tend to enlarge, to run together and to gravitate downwards into the limbs and the lower parts of the trunk, where they form extended, tolerably smooth swellings, pitting on pressure and subsiding abruptly into the sound skin at their upper margins. The membrane lining the nose usually shows dark blood spots and patches, ineffaceable by pressure, even at this early stage, sometimes indeed before any swelling of the skin, but always as the disease advances. Similar spots may be seen on the skins of white animals. The urine is usually dense, thick, ammoniacal, and often brownish-red. Shivering often marks the period of effusion, but there is at first little change of pulse, temperature, breathing, or appetite. As the swellings increase, the animal becomes unable to see, to eat, or even to move, almost, and breathing may be carried on only with the greatest difficulty, through the swollen and

closed nostrils. Transverse cracks and yellowish liquid oozing, appear in the bends of the joints; little blisters with yellowish or bloody contents rise, especially in the hollow of the heel behind the pastern, and, bursting, continue to discharge. Yellowish serum or dark blood may ooze from the general surface of the swelling; patches of skin die, drop off, and leave unhealthy, weak sores with a serous discharge; the exudation may even soften the muscles, and loosen and detach the tendons from the bones, leading to turning up of the toe or other distortions. Sometimes the superficial swellings suddenly subside, and unless a critical diarrhœa or diuresis occurs, serous infiltration of some internal organ like the lungs or bowels is apt to ensue, cutting off the patient suddenly, with great oppression of breathing, or violent and persistent colicky pains, and, at times, a bloody foetid diarrhœa.

The symptoms and dangers vary with the seat of the effusion. The result is most favorable when this is under the skin, the main danger then being from suffocation, extensive death and sloughing of skin, and softening and detachment of tendons and ligaments. Unless improvement is shown by the third or fourth day the disease will usually last over twelve or fourteen days, and the resulting sores even for months.

Prevention.—Keep in strong vigorous health, and avoid the various causes (exposure, etc.,) known to precipitate the malady. Drainage of damp localities is not without its influence. Lastly, avoid weakening treatment in diseases of the respiratory organs, especially such as are attended with a low type of fever like influenza, and, above all, avoid exercising such animals to fatigue, or exposing to inclement weather.

Treatment.—Give a mild laxative (olive oil, linseed oil, aloes,) and follow up by diuretics (sweet spirits of nitre, oil of turpentine, buchu, nitrate of potassa,) carefully graduated in amount to the strength of the patient, and use freely agents calculated to increase the viscosity of the blood (tincture of muriate of iron 1 dr., chlorate of potassa 2 to 4 dr., bichromate of potassa $\frac{1}{3}$ grain,) with bitter tonics (quinia. cascarilla, camomile,) and if neces-

sary to moderate suffering, anodynes (belladonna), or in very prostrate conditions stimulants (alcoholic liquors, oil of turpentine). Locally, the swellings should be often bathed with tepid lotions of tincture of muriate of iron, carbolic acid, or chloride of zinc diluted so as to be non-irritating. Astringent solutions should be assiduously employed about the head, and, if suffocation is threatened, tubes of gutta-percha may be inserted in the nostrils to keep them open. Tracheotomy is to be avoided if possible, together with scarifying of the swellings, because of the risk of unhealthy sores resulting.

Modified Forms.—The mild forms of this affection have been described as scarlatina, the distinction being based on the punctiform nature of the blood-staining, the severity of the sore-throat, and the more moderate exudation. But there is no contagion, nor, indeed, anything that seems to warrant the distinction claimed. This form may be especially benefited by poultices and counter-irritants to the throat, by the inhalation of warm water vapor, and by astringent electuaries (chlorate of potassa 2 oz., vinegar 2 oz., linseed meal 5 oz., syrup sufficient to form a pasty mass. Smear one-eighth of the mass on the back teeth twice a day). Otherwise the treatment is the same as for purpura.

ANÆMIA.—This term is used to imply a deficiency of red globules in the blood, a result which may be determined by a variety of causes described in other parts of this work. Among these may be named: profuse bleeding, excessive secretions from the udder, kidneys, bowels, etc., chronic diseases of digestion, or of the mesenteric glands, feeding on aliment deficient in some essential element, on what has been grown on poor, sandy soils, restriction for a length of time to one kind of food, starvation, diseases of the jaws or teeth, damp, dark, badly-aired buildings, seclusion from sunlight, etc. Some cases, however, are not traceable to any definite cause, and it appears that they set in and progress in spite of good hygienic arrangements, and in the absence of any obvious disease of structure.

Symptoms.—Great and increasing paleness of the mucous membranes, and in white animals of the skin (paper skin); lack of fulness or roundness of the veins; slow, weak pulse; heart's beat slow and heard with difficulty, but excited to palpitation when the patient is subjected to violent exertion; there is great lack of life and energy, and hurried breathing, perspiration and fatigue are easily induced. As the blood becomes poorer all these symptoms are aggravated, movement becomes unsteady, the hair or wool is easily detached, appetite fails, the dung is passed in small quantities and very hard, and a very clear urine of a low density is secreted in excess. In the advanced stages the pale, dull, sunken eye, the puffy appearance of the membrane of the eyelids, the dropsical swellings beneath the jaws or body or in the limbs, the inability or disinclination to rise, the staggering gait, the hurried breathing becoming quick and wheezing on the least exertion, and the palpitations are highly characteristic. Towards the end the urine may pass involuntarily or diarrhoea may supervene. Death sometimes occurs early, before there is much emaciation, and horses will even die in harness.

Prevention.—Avoid everything calculated to reduce the system unduly. Severe depletive treatment of disease (bleeding, purging, diuretics,) should only be resorted to under necessity. Hard work, excessive yield of milk, etc., can only be warranted under a rich, abundant food, and in an animal of great powers of digestion and assimilation. Regularity in feeding, watering and work are essential.

The effect of a spare diet, even in idleness, must be carefully watched, as well as a long continued feeding on one variety of plant. If evil effects are shown, there should be a prompt change to natural hay or grass, consisting of a variety of plants grown on a dry soil, and a liberal supply of grain.

In cases due to parasites or other removable causes, attention to these is manifestly the first step to prevention.

Treatment.—After removal of the causes, support by

nourishing, easily-digested food in small bulk, to avoid exhausting the powers of the stomach. Ground oats, barley, oil-cake, and a little natural hay, may be especially mentioned, though, for weak subjects, thick, well-boiled gruels and beef tea (even for herbivora) may be resorted to. Tonics are all-important (iron, gentian, quassia, cascarilla, cinchona, common salt, pepsin), but should be given in small doses to the weaker subjects. Iron and gentian, given in tinctures, are especially useful. In extreme cases, health may be speedily revived by the transfusion of blood from a healthy animal. In all cases, the patient should be allowed to rest in a dry, warm, well-aired place, and should have light, sunshine, and grooming

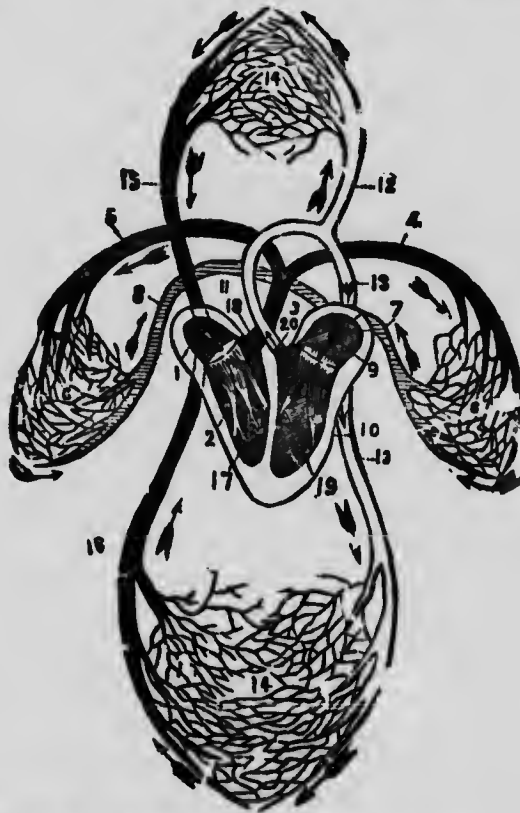


FIGURE SHOWING THE COURSE OF THE BLOOD THROUGH THE HEART, ARTERIES, AND VEINS.

CHAPTER V.

DISEASES OF THE RESPIRATORY ORGANS.

General causes of diseases of the breathing organs. Physical examination of these organs :—Auscultation, percussion. Bleeding from the nose. Nasal Catarrh. Cold in the head. Collection of matter in the nasal sinuses. Abscess of the false nostril. Abscess in the guttural pouches. Tumors in the nose. Malignant catarrh of cattle. Sore-throat. Croup. Roup. Diphtheria. Chronic roaring. Bronchitis. Chronic bronchitis. Glander heaves. Acute congestion of the lungs. Pneumonia. Inflammation of the lungs. Pleurisy. Inflammation of the membrane lining the chest. Pleuro-pneumonia. Broncho-pneumonia. Broncho-pleuro-pneumonia. Hydro-thorax. Water in the chest. Pneumo-thorax. Air or gas in the chest. Abscess of the intercostal spaces. Dropsy of the lung. Apoplexy of the lung. Pleuro-dynia. Rheumatism of the walls of the chest. Asthma in dogs. Heaves. Broken-wind. Bleeding from the lungs. Hæmoptysis. Parasites in the upper air-passages. Gribin the head. Larva of *Estrus Ovis*. *Pentastoma Tænioide*. Parasites in the lower air-passages. Lung-worms of sheep, etc. Lung-worms of horses and cattle. Gape-worm of fowls. Verminous bronchitis in calves, sheep, swine, and birds.

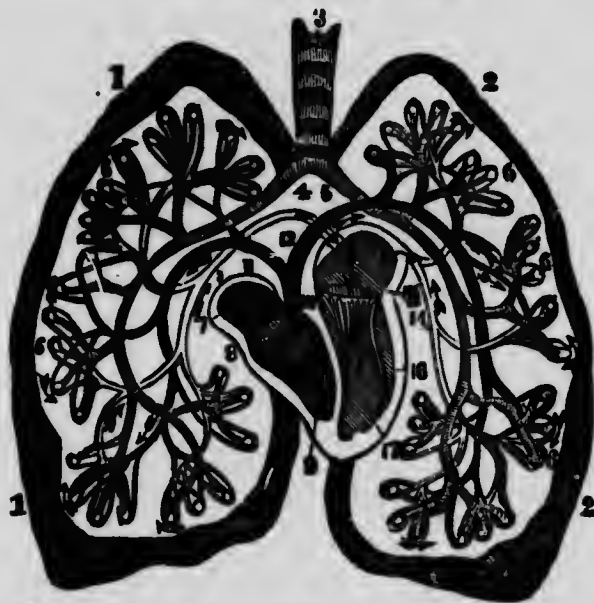
DISEASES OF THE RESPIRATORY ORGANS.—These are of the first importance in domestic animals, alike as regards their frequency and the mortality and other serious consequences they entail. In young horses especially they are far more common and more destructive than any other class of diseases. Among the general causes of diseases of this class of organs the following may be stated in brief: 1. The great extent of the respiratory surface in the lungs = 200 to 500 square feet 2. The extreme tenuity and delicacy of the membrane covering this surface, protective cells (epithelium) being almost wanting in the air cells, contrary to what exists on every other mucous surface in the body. 3. The extraordinary work to which the lungs are subjected in the rapid paces and severe efforts made by the horse. 4. The close, impure air of the stable in contrast to the clear, bracing air

of the fields to which the colt has been accustomed. 5. The effect of the hot relaxing air of the stable is not only on the lungs directly but on the skin, with which the lungs and all internal organs so closely sympathize. 6. The heats and chills, and violent nervous excitement to which young horses are subjected in passing into training and work. 7. The changes of locality, feeding and management to which young horses are subjected on leaving the breeder. The variable weather and sudden, extreme changes of spring and autumn. 9. The susceptibility which results from the want of habitude of bearing extreme heat and cold, and which tells especially at the above seasons. 10. The draughts of cold air to which animals are often subjected, and particularly when warm and perspiring. 11. The frequent exposure to cold drenching rains, night dews, and the like, after the excitement and relaxation consequent on a hard day's work. 12. The arrest of circulation through the lungs owing to imperfect æration of the blood when an animal out of condition is driven at a pace beyond his power of endurance.

Modes of Physical Exploration of the Respiratory Organs.—*Auscultation* and *percussion* are the most essential. The first is the application of the ear alone or with a stethoscope to the surface over some part of the respiratory organs (nose, throat, windpipe, chest,) to listen to the natural sounds of breathing, and to detect any unnatural change or absence of these sounds. The natural sounds must be studied on the healthy animal, and then the different modifications followed on the diseased. In general terms there is a blowing sound to be heard in health over the nose, throat, windpipe, and between the upper and middle thirds of the chest. In the rest of the chest is a soft, rustling murmur, which has been compared to the gentlest zephyr stirring dry leaves. Just behind the left elbow in horses this murmur is absent and replaced by the sounds of the heart. Between the upper and middle thirds of the chest it mingles with the blowing sound anteriorly, but is unaccompanied by that over

the few last ribs. *Percussion* consists in drawing out the resonance of any part by striking it gentle taps with a hard object, the blows fall 1g perpendicularly to its surface, and of a force proportioned to the depth of the organ it is meant to sound. Thus, for the surface, the gentlest taps with the tip of the finger are wanted, while for the centre

SHOWING HOW THE BLOOD IS PURIFIED BY PASSING OVER THE AIR-CELLS OF THE LUNGS.



1, 1, The right lung. 2, 2, The left lung. 3, The trachea. 4, The right bronchial tube. 5, The left bronchial tube. 6, 6, 6, 6, Air cells. 7, The right auricle. 8, The right ventricle. 9, The tricuspid valves. 10, The pulmonary artery. 11, The branch to the right lung. 12, The branch to the left lung. 13, The right pulmonary vein. 14, The left pulmonary vein. 15, The left auricle. 16, The left ventricle. 17, The mitral valves.

of the chest in large animals the closed fist may be advantageously used. For intermediate depths the four fingers and thumb may be brought together, in a straight line at their tips, and the surface tapped with this. When a cavity, enclosed by a hard, bony surface, such as the

nose, is being sounded, it is well enough to tap this direct, but if the surface is soft, as in the chest of fat and fleshy animals, a hard, solid body should be pressed firmly upon it and the taps delivered upon this. As the different parts of the right hand may be used for delivering the taps, so may the two middle fingers of the left hand be employed to compress the soft parts and receive them. The front of the fingers should be applied against the surface, and the hard bony backs turned out to receive the taps. If *percussion* is made over a hollow space, like the nose or windpipe, the sound is drum-like; if over an open, spongy tissue, like the lung, it is much less so, but still full and clear; but if over a solid body, like the thigh, it is dull, dead, or quite wanting in resonance. Behind the left elbow such dull sound is met with in the horse and, to a less extent, in cattle; and on the last ribs on the right side in cattle, sheep and pigs, a similar dulness is found in accordance with the position of the liver. Any increase, diminution, or loss of resonance over particular parts thus becomes of great value as indicating the healthy or unnatural state of the parts. But the observer must learn this matter by experience on the healthy and diseased. These hints are merely thrown out to make what will follow intelligible.

Saignement de nez —

BLEEDING FROM THE NOSE.—Bleeding from the nose is rather rare in animals, and usually results from disease or injury to the mucous membrane, or from violent exertions in coughing, sneezing, drawing heavy loads uphill, or with a tight collar, and especially in animals with a plethoric habit.

Symptoms.—Bleeding in drops (rarely in a stream) from one nostril only, accompanied by sneezing, and without frothing or sour odor. Bleeding from the lungs comes from both nostrils, is bright-red, frothy and accompanied by a cough. Bleeding from the stomach also comes from both nostrils, and is black, clotted, sour, and attended by retching.

Treatment.—Tie the head short up to a high rack or beam, cover head and neck with bags of ice or rugs

wrung out of cold water, and blow matico powder or strong alum water in spray into the nose during inspiration. In obstinate cases, the nose may be plugged with pledgets of tow, tied with a soft cord by which they may be withdrawn when the bleeding subsides. Both nostrils must not be plugged in horses unless *tracheotomy* has first been performed. Internally, may be given gallic acid, acetate of lead, perchloride of iron or ergot of rye.

NASAL CATARRH—COLD IN THE HEAD.—This results from the *general causes* above mentioned and from irritant gases, vapors, etc.

Symptoms.—Sneezing, redness and watering of the eyes, and redness of the membrane of the nose which is at first dry, afterwards discharges a clear watery fluid, and finally a yellowish-white muco-purulent matter. In mild cases there is little or no fever, in the more severe fever may run high.

Treatment.—In mild cases rest in a clear, airy, warm building with suitable clothing and warm bran mash is all that is necessary. In the more severe, steam the nose as for strangles, and slightly charge the air with the fumes of burning sulphur, give warm water injections or even a mild laxative, (horse, ox or sheep, Glauber salts; dog or pig, castor oil), followed by refrigerant diuretics (nitre, acetate of potassa, etc.) If debility ensues feed well and give tonics (gentian, etc.,) and stimulants (spirits of nitrous ether). Chronic discharges may usually be promptly checked by injecting the nose with a weak astringent solution (sulphate of zinc $\frac{1}{2}$ dr., glycerine 1 oz., tepid water 1 qt.) This is thrown in with a syphon having one arm sixteen inches long and the other leaving that at an angle of 45° , three and a half inches long and narrowing to half an inch at the point. The short limb is inserted into the nostril, having first been passed through a hole in the centre of a piece of sole leather intended to prevent the return of the fluid from the nose. The adaptation is perfected by pledgets of tow, and the head being brought into a vertical position the liquid is poured into the long end of the syphon until it rises in

that nasal chamber and escapes by the opposite nostril. One or two such injections are usually sufficient.

COLLECTION OF MATTER IN THE NASAL SINUSES.—

This is common after severe colds in the horse ; and as the result of blows on the forehead or horns in oxen, of injuries from the yoke, etc. ; in sheep from grub in the head, in dogs and horses from the *pentastomata*, and in all animals from diseases of the upper back teeth.

Symptoms.—A more or less constant discharge from the nose, foetid if long retained, and above all if from a diseased tooth, a dulness on percussion on that side of the face between the eyes or just beneath the eyes, and occasionally heat, tenderness and even swelling of these parts, especially below the eye.

Treatment.—Trepine the bone to one side of the median line of the forehead, in the interval between the eyes, and again, an inch above the end of the bony ridge which extends down beneath the eye, and wash out daily, at first with tepid water and finally with the injection recommended for the nose. In the case of parasites these must be rinsed out. Sometimes a slight collection of this kind will recover under injections for the nose and the persistent use of sulphate of iron or copper, or other tonic. If there is a diseased tooth it will be recognized by the dropping of food half chewed, by the swelling and tenderness around the fang of the tooth, and by the intolerable foetor which clings to the fingers when a balling iron has been placed in the mouth and the tooth examined with the hand. Such a tooth must be extracted with large forceps, if already loosened, or if not, an opening should be made upon its fang with a trephine and the offending tooth driven out with a punch and mallet. But there is much danger of injuring important vessels and nerves unless the operator is thoroughly conversant with anatomy.

ABSCESS OF THE FALSE NOSTRIL—This is common in young horses and appears as a slowly increasing, inactive, tense, round swelling in the outer part of the nostril.

It is so firm as to feel solid but collapses at once when opened. It should be laid open from within the nose along its whole length and plugged with tow till the raw edges have healed over.

ABSCESS IN THE GUTTURAL POUCHES.—These are two cavities situated above the throat and peculiar to solipeds. Each has a small opening at its anterior part through which any liquid within them can escape only when the head is depressed. Hence a collection of matter in these sacs, consequent on a sore throat, escapes and is discharged through the nose intermittingly when the head is down drinking, or still more in grazing or nibbling roots. The discharge comes from both nostrils and there may or may not be swelling beneath the ear. Many such cases will recover if sent to grass or fed from the ground and treated with some of the tonics recommended for chronic catarrh or glanders. But should these fail the sac must be laid open, setoned and washed out daily with a weak astringent lotion. This operation requires the most accurate knowledge of the parts to avoid the many important structures in the region.

TUMORS IN THE NOSE.—Tumors of almost every kind grow in the nose and must be removed by surgical means.

MALIGNANT CATARRH OF CATTLE.—This appears mainly in cold, damp, marshy situations where the vitality is impaired, or in unusual seasons. In the cold early summer of 1876, I met with it in cows in several marshy places. Low, damp river-bottoms are most subject to it, and probably it is due to deleterious agents taken in with the food and water as well as to chills and exposure.

Symptoms.—A slight diarrhoea may be followed by costiveness, the dung being black, firm and scanty. The hair is rough and erect, shivering ensues, the head is depressed, the roots of the horns and forehead hot, eyes sunken, red, watery, with turbidity in the interior and intolerance of light, muzzle dry and hot, mouth hot with

much saliva, the membranes of mouth, nose and vagina bluish-red, pulse rapid, impulse of heart weak, breathing hurried, cough, urine scanty and high-colored and surface of the body alternately hot and cold. In twenty-four hours all the symptoms are aggravated, the nose discharges a slimy fluid, the forehead is warmer, and duller on percussion, the mouth covered with dark-red blotches from which the cuticle soon peels off leaving raw sores, appetite is completely lost, dung and urine passed with much pain and straining, and there is general stiffness and indisposition to move. From the fourth to the sixth day ulcers appear on the nose and muzzle, swellings take place beneath the jaws, chest and abdomen, and on the legs, the skin may even slough off in patches, a foetid saliva drivels from the mouth and a stinking diarrhoea succeeds the costiveness. Death usually ensues from the eighth to the tenth day, preceded, perhaps, by convulsive signs of suffocation. The disease strongly resembles the *Russian cattle plague*, but is rarely contagious.

Treatment.—Clear out the bowels by a laxative (olive oil and laudanum), following this up by slightly stimulating diuretics (sweet spirits of nitre, liquor of acetate of ammonia,) with antiseptics (chlorate of potassa, bichromate of potassa, hydrochloric acid). Wet cloths may be kept on the head, the mouth and nose sponged with very weak solutions of carbolic acid, and only soft mashes and sliced or pulped roots allowed.

SORE-THROAT.—This may be confined to the larynx or upper end of the windpipe (*laryngitis*), or the *pharynx* or membranous pouch through which air and food both pass at the back of the mouth (*pharyngitis*), or the whole may be involved (*laryngo-pharyngitis*). There are, besides sore-throats connected with specific diseases (croup, diphtheria, influenza, strangles, distemper and purpura).

The **CAUSES** of simple sore-throat are the same as those of *nasal catarrh*. Bots in the throat may cause it in horses.

Symptoms.—The nose is raised and protruded, the head being carried stiffly and more in a line with the

neck than usual, and there is swelling of the throat or beneath the roots of the ears. There is cough, hard in laryngitis, and dry and husky in pharyngitis, and, later, loose and gurgling in both diseases. With laryngitis there is much tenderness to touch, and, in the early stages, a loud, harsh blowing sound which may become loose and rattling as the disease advances. With pharyngitis there is a little tenderness, but difficulty in swallowing, chewed morsels being often dropped again and water rejected through the nose. The discharge from the nose is more glairy than in nasal catarrh or bronchitis, and on its appearance the active fever usually subsides in great part. If there is much redness of the membrane of the nose, and high fever, the case is likely to be severe, and the same is true of cases with a painful paroxysmal cough.

In *Chronic Sore-throat* there may appear to be general good health, but a cough comes on in paroxysms when the patient comes into the cold air, drinks cold water, eats dry oats or dusty hay, or undergoes active exertion. There are also more or less tenderness and wheezing or rattling in the throat, and sometimes slight swelling.

Treatment.—Rest in a clean, dry, airy stable or box. Clothe warmly and flannel bandage the legs if cold or tending to shiver. Tie a rug or sheep-skin with wool in around the neck. Steam the nose as for *strangles*. Unless the fever and pulse are low or the affection of an, *influenza* type, a laxative is usually beneficial (horser aloes; ox and sheep, Glauber salts; dog and pig, castor oil,) following up with nitre or acetate of potassa in the water, and anodynes as electuaries. Solid extract of belladonna 4 drs.; tannic acid 1 dr.; bisulphite of soda 4 drs.; honey or syrup 5 oz.; mix. Dose—horse and ox a piece as large as a hickory nut; sheep one-fourth, dog one-tenth of this bulk, thrice daily. To be smeared on the back teeth and swallowed at leisure.

In most cases, a thin pulp, made with mustard and water, should be well rubbed in around the throat as soon as the bowels respond, and covered up for two hours, but, in the most severe, this may be preceded for

a day or two by a linseed poultice. The diet throughout must be green, soft mashes or roots.

CROUP.—Especially seen in young animals (calves, lambs, foals,) in cold and damp or high exposed localities. The symptoms are those of severe sore-throat (*laryngitis*) coming on very suddenly with hard croupy cough and dry wheezing, breathing, worse at one time than another, or heard only at particular times of the day (morning, night,) when spasms of the larynx come on. But the most characteristic symptom is the formation of albuminoid false membranes as white as films or pellicles in the throat, and which are discharged in shreds on the second or third day. Fever runs very high, pulse ninety to one hundred, temperature 107° , and even higher.

Treatment.—Give a warm, well-aired building, with water-vapor set free in the atmosphere, if possible; warm clothing, a laxative (sulphate of soda) with antispasmodic (laudanum, aconite, chloral-hydrate, lobelia); follow up with small doses of sulphate of soda, chlorate of potassa and antispasmodics, giving each dose in well-boiled linseed tea, slippery elm or marsh-mallow. Blister the neck actively (mustard, with or without oil of turpentine,) and, if necessary, swab out the throat with a solution of nitrate of silver, ten grs.; water one oz., applied by a small sponge immovably tied on a piece of whalebone. In the worst cases suffocation must be obviated by opening the windpipe in the middle of the neck and inserting a tube to breathe through. In horses a ring must not be completely cut across, but a semicircular piece cut out of each of two adjacent ones. Sometimes stimulants (wine whey, carbonate of ammonia,) and tonics (gentian, cinchona,) must be used to sustain the failing strength.

CROUP OR ROUP IN FOWLS.—*Causes*—Probably similar to those acting on quadrupeds. Exciting diet (wheat, buckwheat, oats,) seems at times injurious. Newly arrived fowls are most liable to contract it, yet it does not

seem contagious in the ordinary sense, but rather inherent in soil, locality or conditions of life.

Symptoms.—Dulness, sleepiness, neglect of food, ruffled feathers, unsteady walk, quickened breathing, with a hoarse wheeze, and an occasional loud crowing noise. On the tongue, at the angle of union of the beak, or in the throat appear yellowish white films (*false membranes*), firmly adherent to a reddened surface, and raw sores where these have been detached. The nostrils may be completely plugged with swelling and discharge so that breath can only be drawn through the open bill. The inflammation may extend along the windpipe to the aerial cavities and lungs, or along the gullet to the intestines. In the first case, death may take place from suffocation, and in the second, from diarrhoea, and as early as in twenty-four hours. Toward the end of an outbreak, the malady may last twenty days and still prove fatal. False membranes may form on other distant parts of the body, but especially the comb, wattles, eye, or on accidental sores.

Treatment.—Disuse raw grain, and feed on vegetables, and puddings made of well-boiled oats, barley or Indian meal. Dissolve carbonate or sulphate of soda, or chlorate of potassa freely in the water drunk, remove the false membranes with a feather or forceps and apply to the surface with a feather the nitrate of silver lotion advised for croup in quadrupeds. If diarrhoea supervenes, give a teaspoonful of quinia wine thrice a day. It is all-important to change the run of the chickens for a time at least.

DIPHTHERIA.—This is seen in pigs, and it is even claimed to occur in horses, but the false membranes in the latter animals rarely amount to more than thickened mucus. It appears to be due to the locality rather than contagion. Close, filthy pens, and want of care have appeared injurious in some cases.

Symptoms.—Sudden illness, with sore-throat and extreme weakness and stiffness of back and loins. The pig moves slowly and crouchingly, with raised head, open dry

mouth, hoarse nasal grunt, livid tongue, and red swollen throat with grayish-white patches of false membranes. The eyes are dull and sunken and the appetite gone. In a few hours all the structures of throat and nose are involved, there is much swelling and threatened suffocation, and shreds of *false membrane* are coughed up. The patient remains down, sits on his haunches, or leans on the fence, and usually perishes in a fit of coughing.

Treatment.—Must be early to succeed, hence, examine the throat for false membranes in all cases of sore-throat in pigs, holding the animal with a noose around the upper jaw. If white patches are seen, apply at once and freely the nitrate of silver lotion advised for croup, and repeat as often as may seem necessary to keep the diseased growths in check. The bowels may be freely opened by a purgative (jalap) and twenty drops of tincture of the muriate of iron, and ten grains nitre given thrice a day in a tablespoonful of cold water. Great attention must be given to the comfort and to secure soft, easily-digestible food for sometime.

CHRONIC ROARING IN HORSES.—This is a wheezing, whistling or hoarse rasping sound made in the upper part of the windpipe (larynx) in breathing, and especially when excited. It is usually due to paralysis and wasting of the muscles on the left side of the larynx and which open the channel for the air, and in such cases the noise is only made in drawing air in. But any obstruction in the large air tubes will give rise to roaring, heard most commonly in both inspiration and expiration. Thus palsy of the nostrils, fracture and depression of the bones of the nose, tumors in the nose, throat windpipe or bronchi, false membranes extending across the air passages, dropsical swelling about the throat, and in stallions undue accumulations of fat, may give rise to it. In the typical form with palsy of the laryngeal muscles the animal grunts (groans) when led up to a wall; or if a feint is made to strike him on the ribs. If galloped up a steep hill or over a newly plowed field, or even for some distance on level ground, the *roaring*

as strikingly brought out. The same holds good if made to draw a heavy load or one with the wheels dragged.

Treatment.—In incipient cases with simple thickening of the mucous membrane, benefit may arise from swabbing out the larynx with nitrate of silver solution, as recommended for *croup*, or firing the skin over the throat with a red hot iron. But if the muscles are wasted and fatty these means will be fruitless, and we must look to mechanical or surgical measures for help. Pads attached to the nose-band of the bridle and so arranged that they will lie on the false nostrils and check somewhat the ingress of air will enable many roarsers to do moderate work with comparative comfort. In the worst cases in which the animal is rendered useless, *tracheotomy* may be performed and the animal made to breathe through a tube inserted in the middle of the neck. Or finally, the larynx may be laid open with the knife, and the flap of gristle (arytenoid), which is drawn in, valve-like, over the opening by the current of air, cut off.

Some cases of roaring due to feeding on vetches, (*Lathyrus Sativa* or *Cicera*) may be cured by changing the feed, and giving some doses of *nux vomica*. Others due to dropsical effusions appear intermittently and may be benefited by tonics and iodide of potassium, with hard, dry feeding and exercise. Tumors and other mechanical obstructions must be removed with the knife.

Finally roaring is often hereditary in horses with a narrow space between the jaws and thick short neck, with badly set on head, and such should be rejected for breeding purposes.

BRONCHITIS.—Inflammation of the large air tubes within the lungs. It may be looked upon as an extension downward of nasal catarrh or sore throat, and frequently supervenes on one or other of these. Otherwise it owns the same general causes with these affections. It may also attend on influenza, strangles, contagious pleuro-pneumonia, distemper in dogs, tuberculosis, and parasitic diseases of the lungs.

Symptoms.—In *mild cases* there are dulness, impaired

appetite, hot dry mouth, red membrane of nose, accelerated pulse and breathing, and a cough at first hard but becoming soft and rattling as discharge is established from the nose. Such may recover in a few days without treatment.

In *severe cases* there is dulness, inappetence, hot, dry mouth, increased temperature, rapid pulse, labored breathing, with loud blowing sounds over the lower end of the windpipe and behind the middle of the shoulder-blade. The cough is dry, hard, sonorous and painful (barking), often occurring in fits and seeming to come from the depth of the chest. *Percussion* detects no change of resonance at any part of the chest, as in *pneumonia*. The membrane of the nose has a dark red or violet hue, varying in proportion to the general implication of the bronchial tubes and especially the smaller ones, and there is drowsiness and drooping of the head in the same ratio.

From the second to the fourth day a whitish discharge sets in from the nose, the cough becomes soft and rattling, the noise over the windpipe and behind the shoulder-blade less harsh and blowing, but with a slight rattle from bursting bubbles, and the symptoms of fever abate. From this time improvement dates, and recovery may be complete in two or three weeks.

Solipeds stand obstinately throughout the disease, other animals may lie. There is no tenderness on punching the ribs, as in *pleurisy*.

Treatment.—Rest in a warm, dry, airy building, clothe warmly, bandage the limbs in cold weather and give warm sloppy mash of wheat bran. A laxative is often useful, but if there is weakness, small pulse, prostration or any yellowish tinge of the mucous membranes, is to be removed and warm water injections used in place to move the bowels. Give frequent diuretics (nitre, sweet spirits of nitre,) anodynes (belladonna, lobelia, aconite,) and expectorants (liquor ammonia acetatis, oxymel of squill, guaiacum, ipecacuanha. antimony). The nose should be frequently steamed, as in for *strangles*, and inhalations of sulphur fumes mixed with the air, and not too strong, may be added. Mustard or other blisters should be ap-

plied to the sides of the chest, and repeated if any renewed access of disease seems to demand it. When fever has nearly subsided, and there is left only a white discharge from the nose, tonics should be used. (See those recommended for *glanders*.)

When there is much prostration and weakness, stimulants (aromatic ammonia, carbonate of ammonia, wine, etc.,) may be required, even in the early stages.

GLANDER HEAVES, CHRONIC BRONCHITIS IN HORSES.

—This arises from the same causes as the acute disease and often follows it. It is characterised by a frequent weak wheezing, husky, and almost inaudible cough, often occurring in fits; a white discharge from the nose, with white flocculi, like buttermilk; great shortness of breath in exertion; and a mucous rattle in the lungs. *Percussion* shows increased resonance over the lower and posterior borders of the lungs. The right side of the heart may be enlarged and easily felt beating behind the right elbow.

Treatment is not very satisfactory in cases of old standing. Feeding should be mainly of soft mashes, roots and other laxative agents, but never bulky. Linseed, oat, barley or corn meal may be given wet and hay replaced by corn-stalks or good fresh grass. Finally give tonics, mainly arsenite of strychnia, or sulphate of iron or copper and tannic acid.

ACUTE CONGESTION OF THE LUNGS IN HORSES.—

This is always the first stage of *Pneumonia*, but may occur in a sudden and fatal form from over-exertion in fat or otherwise ill-conditioned horses. An animal that has stood idle in the stable or has been rapidly fattened for sale, when taken out and driven or ridden at the top of his speed soon hangs heavily on the bit, slackens his speed, and if not stopped, staggers and falls; or the exertion is passed through but the animal is seized when returned to his stable. He then stands with dilated nostrils, quick, labored, convulsive, wheezy breathing, extended head, staring blood-shot eyes, agonized expression, deep red or blue nasal membrane and rapid, weak

pulse, often almost imperceptible at the jaw. *Auscultation* detects a loud respiratory murmur and the finest possible crepitating sound. The heart is felt behind the left elbow beating tumultuously and the limbs are cold, though perspiration may break out at different parts of the body. If blood is drawn it flows in a dark, tarry-looking stream, and the lungs after death might be compared to a dark-red jelly.

Treatment.—Remove girths, saddles and whatever may hamper breathing, turn the head to the wind, give an active stimulant (alcohol or alcoholic liquors, ammonia or any of its compounds, oil of turpentine, ether, sweet spirits of nitre, ginger, pepper), the first that comes to hand, in a full dose, following up with warm water injections and active hand rubbing. In extreme cases prompt relief may often be obtained by bleeding from the jugular, but this should not replace the measures already advised but should be added to them. An excellent resort when available is to wrap from head to tail in rugs wrung out of hot water and cover thickly with dry ones, the limbs being meanwhile actively hand-rubbed to bring the blood to this part of the skin which the rug cannot reach.

If the patient survives and does not at once entirely recover the case becomes one of *pneumonia*.

PNEUMONIA—INFLAMMATION OF THE LUNGS.—

Causes.—The same as in other acute diseases of the chest. Also the result of over-exertion and acute congestion, or of parasites in the lung.

Symptoms.—If not following an acute congestion as above described there is shivering, more or less severe according to the gravity of the attack, and usually a dry cough. This is followed by hot skin, with increased temperature, quick but deep labored breathing and a full but oppressed rolling pulse, redness of the membranes of the eye, nose and mouth; the cough is deep as if from the depth of the chest, but not so hard or so painful as in bronchitis. The horse always, and the ox, in bad cases, obstinately stands with legs apart, elbows turned out, nose extended and usually approached to a door or

window. In cattle expiration is generally accompanied by a moan. With the fever there is costiveness, high-colored, scanty urine, in cattle, heat of horns and ears and dryness of muzzle, and hidebound. Auscultation detects a very fine crackling (crepitation) over the affected part of the lung, or there may be an area of no sound encircled by a line of crepitation, and beyond that by the normal murmur slightly increased. Or over the dull spot the blowing sounds from the larger tubes or the beating of the heart may be detected. Percussion causes flinching or even groaning when the affected part is reached; the space where sound was wanting in auscultation sounds dull and solid and the remainder of the chest retains its healthy resonance. There is no tenderness on merely pinching the spaces between the ribs. By auscultation and percussion the increase or decrease of solidification (*hepatization*) of the lung may be followed from day to day excepting in the parts covered by the thick, muscular shoulder. In this way aggravation and improvement can be noticed. A yellowish or whitish discharge from the nose comes on as the disease advances.

Treatment.—Give a pure, dry, airy box with windows or doors turned to the sun or away from the direction of prevailing winds, clothe warmly, and flannel bandage the limbs, or even rub them with ammonia and oil. The hot rugs advised for congested lungs may be applied, and when removed let it be done a little at a time, and the part rubbed dry and covered by a dry blanket. Or a mustard poultice may be applied to the sides of the chest. Large injections of warm water and drinks of warm gruel may also be given. A laxative is often beneficial in the more active forms of the disease, but should be given cautiously as in bronchitis, and rejected when there is low fever, and much depression. Neutral salts (nitre, acetate of potassa, bicarbonate of soda,) should be given with sedatives (belladonna, henbane, tincture of aconite, digitalis or white hellebore; in pigs and dogs, tartar emetic,) or if there is much prostration, or when the fever has in the main subsided, stimulant diuretics (sweet spirits of nitre, liquor of acetate of am-

monia,) repeated three or four times a day. The sides should be blistered with a pulp of the best ground mustard in water, or Spanish flies, or in cattle and swine, mustard and turpentine, and the blister may be repeated with advantage in protracted cases. When in severe cases the blister refuses to rise, the skin may be first warmed with rugs wrung out of boiling water and then the application of the blister made. Or a hot shovel held near the blistered surface may determine an active flow of blood to the skin and the rising of the blister. When well risen the surface must be kept soft by sweet oil or fresh lard to favor healing. In chickens it is advised to open the bowels by a teaspoonful of castor-oil, and shake one-twelfth grain of tartar emetic on the tongue twice a day. If very weak or prostrate give a teaspoonful of sherry thrice a day.

PLEURISY.—INFLAMMATION OF THE MEMBRANE LINING THE CHEST AND COVERING THE LUNGS.—This is common in all domestic animals and particularly in cold, exposed localities, which suffer at the same time from rheumatism. Otherwise it owns the general causes of chest disease.

Symptoms.—Shivering, followed by heat of the skin and even of the limbs, and partial sweats of the surface, uneasy movements, pawing and sometimes looking at the flanks, lying down and rising. If one side of the chest only is involved that fore limb is often advanced in front of the other. The pulse is rapid, hard and incompressible, and the breathing highly characteristic. It is hurried, carried on chiefly by the abdominal muscles, and has the inspiration short and suddenly checked, while the expiration is slow and prolonged. This character of the breathing may be well observed with the ear placed on the false nostril, on the windpipe, or on the side of the chest. There is a prominent ridge on the abdomen from the outer angle of the hip bone to the lower ends of the last ribs. By handling the spaces between the ribs a point is reached which is exceedingly tender, the patient flinching and even groaning when it

is touched. The ear applied to the same spot detects a soft, rubbing sound during the movements of inspiration and expiration. There is at first no other change in auscultation or percussion. The animal often changes his posture or place as if seeking an easier position, and emits a short, hacking, painful cough. There is less redness of the nose than in pneumonia or bronchitis, less heat of the expired air and no nasal discharge.

In twenty-four to thirty-six hours effusion ensues in the cavity of the chest, the rubbing sound ceases, the catching breathing and ridge on the belly disappear, the pulse becomes soft, the anxiety of countenance passes away, and the patient may begin to feed as if well. But soon the pulse loses its fulness, and gains in rapidity, breathing becomes labored and attended with a lifting of the flank and loins, the nostrils are widely dilated, the nose protruded, the elbows turned out, the skin sweats, and there may be signs of imminent suffocation. Auscultation detects no sound over the lower part of the chest up to a given horizontal line, and up to the same level there is dulness on percussion. This shows the extent of watery effusion. The pulse becomes weak, with a peculiar thrill at each beat, the limbs and lower aspect of the chest swell, the patient moves unsteadily and falls suddenly to die.

In other cases the effusion is re-absorbed and a good recovery is made. In others it ceases to increase but fails to be taken up and remains as a cause of short wind; it may even give off gases, in which case a gurgling sound may be heard in the chest, or a sound as of drops falling into a half empty barrel, after the patient rises from the recumbent position. In other cases still there remain false membranes attaching the lung to the inner sides of the ribs, or enveloping the lung in whole or in part, and in either case impairing respiration.

Treatment.—Give the same general care as in bronchitis and pneumonia. In the early stages of chill treat as for congested lungs. Later give a laxative (horse, albes; ox and sheep, Glauber salts; swine and dogs, castor-oil,) following it up with neutral salts (nitre, acetate of potas

sa, liquor of the acetate of ammonia,) in full doses, and anodynes (digitalis, aconite). These may be used in the fullest doses after effusion has taken place, and in weak subjects stimulants (sweet spirits of nitre, ether, alcoholic liquids, tincture of gentian,) should be added. Iodide of potassium may also be given internally, and tincture of iodine rubbed on the chest.

In very severe cases, a large linseed poultice may be applied over the chest, or it may be shaven and subjected to dry cupping, or an active blister may be applied as for pneumonia.

If there is extreme effusion threatening suffocation the liquid must be drawn off by a small cannula and trocar (see Tympany) inserted at the anterior border and near the lower end of the ninth rib, the skin having first been drawn aside to form a valvular wound, and great care being taken to prevent the entrance of air. The liquid should be drawn off only in part at first to avoid shock, and the operation repeated in a day or two. It should be followed by tonics (sulphate of iron, tincture of gentian,) stimulants (sweet spirits of nitre) and diuretics (iodide of potassium).

PLEURO-PNEUMONIA, BRONCHO-PNEUMONIA, AND BRONCHO-PLEURO-PNEUMONIA are common complications of the three diseases, *bronchitis*, *pneumonia*, and *pleurisy*, and their respective symptoms and treatment may be inferred from the description of the uncomplicated affections.

HYDROTHORAX.—WATER IN THE CHEST.—Besides the effusion of liquid into the cavity of the chest in pleurisy, dropsical effusions may take place into it in connection with weak, bloodless conditions, as in *flukes in the liver*, disease of the heart, enlarged bronchial lymphatic glands and other morbid states. The symptoms resemble those of *hydrothorax* following pleurisy, only there is no fever, and there are the indications of those other diseases on which it is dependent. The treatment is essentially the same after the morbid condition which

has caused the effusion has been removed. If that is incurable neither can this be remedied.

PNEUMOTORAX.—AIR OR GAS IN THE CHEST.—This often attends on hydrothorax when the contained liquid has undergone some decomposition. More frequently it is the result of a wound penetrating the walls of the chest, with its edges pressed inward so that they admit the air from without, while the chest is dilating, but close like a valve when it is contracting. A little thus entering with each breath and none escaping, the lung is soon compressed into a small solid mass against the lower end of the windpipe. The same may happen from a broken rib having torn the surface of the lung even without any external wound. A little air escaping from the lung with each respiration the cavity soon becomes filled and the lung compressed and collapsed.

Treatment is limited to the prevention of the introduction of air through an external wound, should such exist; the relief of pain by opium and other anodynes; the management of the resulting pleurisy on ordinary principles; and the drawing off of the accumulated air by a needle-like tube and aspirator, or even by a small cannula and trocar. Spontaneous recovery often takes place, the wound being closed by inflammatory exudation and the air absorbed. In cases dependent on decomposition of the products, both gas and liquid should be drawn off and a weak solution of carbolic acid (one part to two or three hundred water) thrown in, in small quantity.

ABSCESS OF THE INTERCOSTAL SPACES.—This occurs especially in the horse as a result of pleurisy, a diffuse swelling appearing at some part of the walls of the chest, tender and pitting on pressure, and, finally, softening in the centre, bursting and discharging a yellowish or whitish matter. The patient should be well fed, and poultices or warm fomentations continuously applied to the part until there is softening in the centre, when it may be freely laid open. Continue to support the patient by nourishing food, stimulants and tonics.

DROPSY OF THE LUNG.—This is mainly a result of valvular and other diseases of the heart. To percussion and auscultation it gives nearly the same symptoms with pneumonia, but there is an entire absence of fever. The co-existing heart disease also serves to reveal its true nature. Its cause being usually incurable, it terminates fatally in the majority of cases. Treatment must be altogether directed to the disease of the heart.

APOPLEXY OF THE LUNG.—In the lower animals extravasation of blood into the substance of the lung is usually the result of profound alterations in that liquid as in *Malignant Anthrax*, *Purpura Hæmorrhagica*, *Typhoid Fever* or *Intestinal Fever*. A portion of the lung tissue gives way and the blood escaping raises the membrane covering it (pleura) from a half to three inches above the natural level. The extravasation has the appearance of a fine jelly and often preserves the shape of the pulmonary lobules—a cone with the apex turned in. Being usually a complication of another disease, treatment must be directed to that rather than the local lesion.

PLEURODYNIA.—This is a term applied to rheumatism of the muscles between the ribs, which bears a strong resemblance to pleurisy. It may be distinguished by the co-existence of rheumatism in other parts and by the comparative absence of fever, cough, rubbing sounds and effusion. Treat it like other forms of rheumatism.

ASTHMA IN DOGS.—A spasmodical affection of the circular muscular fibres of the bronchial tubes, occurring in paroxysms with irregular intervals and associated with corpulence and disordered digestion, distended or ruptured air-cells, mucous discharges from the air-passages and dilatation of the right side of the heart.

Causes.—Usually in pet dogs pampered with highly seasoned articles of food, in excessive quantity, and deprived of exercise. A change of food or temperature, a smart walk or run or indeed any exercise will bring it on.

Symptoms.—Corpulence is a constant condition at the outset though the subject may be emaciated and worn

out in the advanced stages. A slight cough becomes frequent, hard and sonorous, with habitually labored breathing aggravated at intervals so as to threaten suffocation. Then the patient stands with open mouth, pendent tongue and staring eyeballs, panting for breath and having his condition rendered still more threatening by every change of position or cause of excitement. The frequency and severity of the attacks serve as a means of estimating the danger of the patient. In the intervals between these paroxysms may be noticed signs of indigestion, in a variable appetite, perhaps vomiting, a tumid tympanitic (bloated) abdomen, constipation and piles. The skin is dry, harsh and bald in patches, the teeth covered with tartar and the breath foetid.

Treatment.—1. *During a paroxysm.*—Cause to inhale ether, chloroform, the fumes of burning stramonium or of burning paper which has been steeped in a strong solution of nitre; or one or two teaspoonfuls of laudanum with 2 oz. castor-oil may be thrown into the gut as an injection. Or if there is reason to suspect overloading of the stomach shake a grain of tartar emetic on the tongue.

2. *In the intervals between the paroxysms.*—Check any existing bronchitis or pneumonia as advised in the earlier pages of the book, and restrict to a very moderate diet of oat meal or corn meal mush, with skim-milk or butter-milk. Exercise well but in no case for three hours after feeding. Give a laxative of castor-oil twice a week. Wash frequently with soap, drying afterward by rubbing, and brush daily. A daily sedative (stramonium, tartar emetic,) is beneficial, but in advanced stages and weak conditions, vegetable tonics (quinia, gentian,) will be demanded.

HEAVES—BROKEN WIND.—This is closely allied to asthma, but is more continuous in its symptoms, and less paroxysmal.

Causes.—Overfeeding on clover hay, sainfoin, lucern and allied plants: on chaff, cut straw and other bulky and innutritious food. In Arabia, in Spain, and in California where there is no long winter feeding on hay, and in our

Territories where clover is not used, heaves is virtually unknown; it has advanced westward just in proportion as clover hay has been introduced as the general fodder for horses, and it has disappeared in England and New England in proportion as the soil has become clover sick and as other aliment had to be supplied. The worst conditions are when a horse is left in the stable for days and weeks eating clover hay, or even imperfectly cured, dusty hay of other kinds, to the extent of thirty pounds and upwards daily, and is suddenly taken out and driven at a rapid pace. Violent exertions of any kind, and diseases of the lungs are also potent causes. It is mainly a disease of old horses, but may attack the colt of two years old. Finally, horses with small chests are most liable, and thus the disease proves hereditary.

Symptoms.—There is a double lift of the flank with each expiratory act, there being first a falling in of the abdominal walls and then, after a perceptible interval, a rising of the posterior part of the belly to complete the emptying of the chest; also a short, dry, weak, almost inaudible cough, followed by a wheeze in the throat, and occurring in paroxysms when violently exercised, when brought from the stable into the cold air, or after a drink of cold water. The breathing is accompanied by a wheezing noise above all evident when the patient is excited by work, or when the ear is applied on the side of the chest. Indigestion is also a prominent symptom and manifested by a ravenous appetite, even for filthy litter, by the frequent passage of wind from the bowels, and often by swelling and drum-like resonance of the abdomen. When starting on a journey the subjects pass dung very frequently at first, and after travelling some distance may go much better. Their muscular systems are soft and flabby and they run down rapidly in active work. Frequent aggravations of the symptoms may be seen in connection with overloaded stomach, costiveness, a hot, close stable, a thick, muggy atmosphere, or a very severe day's work.

The symptoms may be temporarily masked or hidden by restriction in diet, abstinence from water and the use

of sedatives, but there remains an unnatural action of the nostrils, and a full drink of water, and above all a free supply of water and hay will bring back the symptoms in all their intensity.

Treatment.—Turning out on natural pastures or feeding cornstalks or other laxative food will relieve, and even cure mild and recent cases. Feeding on dry grain with carrots, turnips, beets, or potatoes and a very limited supply of water will enable many broken-winded horses to do a fair amount of work in comfort. Hay should never be allowed except at night, and then only a handful clean and sweet. The bowels must be kept easy by laxatives (sulphate of soda 2 or 3 oz.), the stable well aired, and sedatives (digitalis, opium, belladonna, hyoscyamus, stramonium, lobelia,) used to relieve the oppression. If a white discharge from the nose co-exists tonics should be given as for chronic bronchitis, to which wild-cherry bark may be added. Tar water as the exclusive drink is often useful and a course of carminatives (ginger, caraway, cardamoms, fennel, fœnugrec,) may be added with advantage. But nerve tonics and above all arsenic in 5 grain doses daily, and continued for a month or two, are especially valuable.

No broken-winded horse should have food or water for from one to two hours before going to work.

The following recipe has been highly recommended for heaves : 1 ½ oz. laudanum, 1 ½ oz. pure ether, 1 pint raw linseed oil. Mix well. Dose the whole in severe cases ; in mild cases half the above.

BLEEDING FROM THE LUNGS.—May occur in any of our domestic animals as a result of excessive plethora, over-exertion, disease of the heart or tuberculosis. If in limited quantity, the blood comes from the nostrils and mouth of a light red and frothy and with coughing. If in greater amount it may fill the bronchial tubes and cause death suddenly by suffocation without much escape by the nose.

Treatment.—When brought on by severe exertion perfect rest and quiet walk will check. Keeping the head

elevated, cold applied to the head and neck, iced drinks acidulated with vinegar or mineral acids, are useful. Opium benefits by checking the cough, and in obstinate cases acetate of lead, ergot of rye, matico, tincture of muriate of iron, or oil of turpentine may be given internally three times a day. Remove costiveness with Glauber salts and keep in a cool, airy place at rest for at least a fortnight.

PARASITES IN THE UPPER AIR PASSAGES.—The GRUB IN THE HEAD of Sheep is the larva of a small gadfly (*Cestrus Ovis*) which deposits the live embryo on the margin of the nostril, whence it creeps up into the nasal sinuses. It stays there during the winter and spring, often proving harmless but sometimes causing much irritation, redness of the nostrils, and a white, muco-purulent discharge, with dulness and stupor from sympathetic disease of the brain. To *prevent* the attacks of the fly the sheep should be fed salt from two-inch augur holes bored in a log, the surface of which is smeared with tar, so that they get a dressing every time they partake. A less satisfactory method is to turn up a furrow in the pasture so that the sheep may push their noses into the ground when attacked.

Treatment.—Place in a warm building to tempt the larvæ from the sinuses, and introduce snuff, solutions of salt, vinegar or tobacco, weak solutions of turpentine, etc., into the nose to kill them, or cause their expulsion by sneezing. For such as remain in the sinuses the only successful treatment is to trephine the bones of the face between the front of the eye and the median line of the face, or just in front of the root of the horn, should that be present. The sinus is then to be syringed out freely with tepid water until the parasites are washed out.

The *Pentastoma Tænioides* is a species of acarus which lives in the nasal sinuses of horses and dogs, and in the mesenteric glands of sheep and other herbivora. If productive of much irritation in the nose, it must be expelled by a current of water after trephining the sinus.

PARASITES IN THE LOWER AIR PASSAGES.—The most common are the different forms of round worms, which in certain animals (lambs, calves, pigs, birds,) may assume the dimensions of a plague, and cause enormous yearly losses to a country.

The *sheep, goat, dromedary* and *camel* harbor two round worms in their air passages and lungs: the small *Strongylus Filaria*, a thread-like worm of one to three and one-half inches long, and *S. Rufescens* of considerably greater length. The *calf, horse, ass* and *mule* have the *Strongylus Micrurus* of from one and one-half to three inches long. The *pig*, the *Strongylus Elongatus* of eight lines to one and one-half inches long. Finally the bird (*hen, turkey, pheasant, black stork, magpie, hooded crow, green wood-pecker, starling, swift, etc.,*) have the *Syngamus Trachealis*, male one eighth inch, and female one-half to five-eighths inch in length, always found united together, so that the male appears like a process from the neck of the female.

The *Strongyli* in their mature condition inhabit the air passages within the lungs, but they may be reproduced either in or out of the body. In the first mode the female worm creeps into an air cell and there encysts herself, and produces eggs or young worms already hatched, or she dies and the myriad eggs, hatching out amid the debris, the young worms finally migrate into the adjacent air passages, grow to maturity, and reproduce their kind. In the second mode the impregnated female worm is expelled by coughing, and perishes in water or in moist earth or on vegetables, and the eggs, escaping from her decomposing remains, may lie unhatched for months, or even a year, or, in genial weather, may rapidly open and allow the escape of the almost microscopic embryo worms. These, in their turn, may live an indefinite length of time in the water, or moist soil, or on vegetables, and only begin to grow to their mature condition when taken in by a suitable host with food or water. This is true of those of the *sheep, goat* and *camel*, of that of the *ox, horse* and *ass*, and of that of the *pig*. Only those of the *sheep*, once introduced into the system, will main-

tain their place in the lungs for the whole lifetime of the host, though no more young worms should be taken in. That of the ox, etc., on the other hand, is more likely to be expelled, and, therefore, often infests its host but for a limited period.

The *Syngamus* of the bird has probably the same history out of the body, but this has not been so carefully studied.

Within the chest the *Strongyli* live in the small terminal air passages in their young or embryo state, in the larger air passages when mature, and in cysts in the lung substance when laying their eggs, or when about to die that the eggs may be set free and hatched. In the air passages they give rise to bronchitis, in the lungs to pneumonia and deposits resembling tubercles, but distinguishable under the microscope by the presence of the elliptical eggs and the embryo worms.

The *Syngamus* of birds inhabits the air passages, and gives rise to bronchitis.

In all cases the parasites are most fatal to the young. Although old animals continue to harbor them, they prove much less destructive and are often unsuspected.

SYMPTOMS IN CALVES AND FOALS.—VERMINOUS BRONCHITIS.—HOOSE.—HUSK.—These are essentially those of bronchitis, with the difference that the whole herd is affected and mucus coughed up, containing worms, either singly or rolled up in bundles. There is at first only a slight rather husky cough repeated at irregular intervals. There follows dry, staring coat, embarrassed breathing and advanced emaciation. Soon the cough becomes frequent, paroxysmal and suffocating, with expectoration of mucus and worms. Or the cough is soft, loose and wheezing, and the patient is weak, hide-bound, with sunken eyes and pale, thin or puffy membranes, dropsical swellings beneath the jaws, chest or belly, and no appetite; the sufferer may be found apart from its fellows, in a corner or under a tree, covered with flies and sinking rapidly into extreme debility and death. Intestinal worms (in cattle, *Strongylus Ra-*

diatus, *Sclerostomum Hypostomum*, *Ascaris Lumbricoides*, *Tænie Expansa*, etc., in foals, *Sclerostomum Equinum*, *S. Tetracanthum*, *Ascaris Megalocephala*, *Oxyuris Curvula*, etc.,) usually co-exist to a most injurious extent, causing diarrhœa and other irregularities of the bowels.

In the worst cases death may result ten or fifteen days after the onset, though more commonly it is delayed two or three months, and recovery may take place.

Prevention.—In localities and countries to which the disease is new the parasite should be killed out by the continuous medical treatment of the diseased animals, or if necessary their destruction, and the separation of all horses, asses, mules and cattle from the infected pasture or its vicinity, and from any stream of water running through or close to it; as well as from all fodder, roots, grain, etc., grown on such land for several years after. In infested localities calves and foals should never be pastured on land recently occupied by older stock of the same kind, or allowed access to water used by such stock. Sheep, goats or pigs may be safely fed on such land. Avoid over-stocking. Drain the land, to clear off pools or wet spots. Keep the young stock from infested or suspected pastures while wet with dew or rain, and from clover or allied plants, which, by their moisture, are liable to harbor the worm. Suspected beasts should be kept apart from the healthy and from healthy pastures until subjected to thorough and continuous treatment. The carcasses of the dead should be very deeply buried, or better, the lungs and windpipe removed and burned to ashes. All exposed animals should be well fed on a diet including dry grain, and should be allowed salt to lick at will, this being destructive to the young worms.

Treatment.—Feed liberally on linseed cake, rapè cake, cotton cake, roots, maize, oats, beans or other sound nutritious diet, to which may be added a mixture in equal parts of sulphate of iron, gentian and ginger, in proportion of four ounces to every ten calves of three months. To destroy the intestinal worms, give every morning, fasting, a tablespoonful of table salt or an equal amount

of oil of turpentine shaken up with milk. For the lung parasites, place the affected animals in a close building and burn pinch after pinch of flowers of sulphur on a piece of paper laid on an iron shovel, until the air is as much charged with the fumes as they can bear without coughing violently. The administrator must stay with them in the building to avoid accidents and keep up the application for half an hour at a time. It should be repeated several days in succession, and at intervals of a week for several weeks, so as to kill the young worms as they are hatched out in successive broods, and not until all cough and excitement of breathing have passed should the animal be considered as safe to mix with others or to go on a healthy pasture.

SYMPTOMS IN SHEEP, GOAT AND CAMEL—VERMINOUS BRONCHITIS.—These are the exact counterpart of those in the calf. There is a short, dry, sonorous cough, with a frothy discharge from the nose containing worms or their eggs, loss of appetite, rapid wasting, diarrhœa, shedding or drying and flattening of the wool, excessive thirst and irregular or depraved appetite, there being a disposition to eat earth. In the advanced stages the cough becomes very harassing and death may ensue from suffocation. Intestinal parasites (*Strongylus Contortus*, *S. Radiatus*, *S. Filicolis*, *Sclerostomum Hypostomum*, *Tænia Expansa*, and, perhaps, *Sclerostomum Duodenale*,) are even more numerous and injurious than in calves.

Prevention.—All the measures advised for the disease in calves will apply equally well here, with this proviso, that the parasites only affect sheep, goat, dromedary and camel, so that they only must be kept apart, while infested pastures may be safely grazed by cattle, horses, asses or mules. Nathusius obviated the attacks by keeping the early lambs in sheds and boxes until May, and the late ones until autumn, and by feeding in the same places on roots and hay in wet weather. Abundant dry feeding and a free access to salt are especially desirable.

Treatment.—This is precisely the same as for calves. The tonic mixture (iron, ginger and gentian,) may be

given to the extent of two ounces to every ten three months lambs daily. For the intestinal parasites, a teaspoonful each of salt and oil of turpentine may be given in milk every second day, before eating if possible. Fumigate precisely as for the calf.

SYMPTOMS OF VERMINOUS BRONCHITIS IN PIGS.—Rayer and Bellingham supposed these parasites to be harmless to pigs, but my experience agrees with that of Deguileme, that they will accumulate in such numbers as to cause bronchitis and death. The symptoms are essentially the same as in other animals—the coughing up of worms and eggs being the only reliable evidence of the disease.

Prevention and treatment are essentially the same as for lambs and calves.

SYMPTOMS IN BIRDS—GAPES.—Young turkeys or chickens a few days old frequently open the mouth wide and gasp for breath, sneeze and make efforts at swallowing. These movements become more constant and severe, breathing is oppressed and wheezing, and the little patients grow languid and dispirited, droop and die. It is especially prevalent on old-established farms with large flocks of fowls.

Treatment.—The worms may be partly removed by a feather stripped of all its plumes except at the tip, or still better by a horse-hair twisted up so as to have a very fine loop. The mouth being opened the feather or hair is passed into the opening seen in the middle of the tongue, pushed to the lower end of the windpipe, turned round several times and withdrawn, when a few worms will be found attached. It may be repeated at intervals and is still more effectual if the instrument is first dipped in oil, salt water, or a weak solution of carbolic acid, tobacco or sulphurous acid. The treatment is only partially successful as it fails to remove worms lodged in the bronchial tubes or air sacs. Cobbold made an incision in the windpipe and extracted the worms with forceps, while Bartlett succeeds with turpentine smeared on the

neck and which is, of course, inhaled. A removal from the contaminated ground, the supply of pure water (boiled if necessary) and an abundance of nourishing diet are essential elements of treatment.

Prevention.—Burn all the worms extracted from the air passages. Keep fowls from ground and houses which are known to be infested, until they have been soaked in a strong solution of salt or with crude carbolic acid or petroleum. Suspected water must be withheld or boiled. Avoid all green food from an infested locality. The carcasses of the dead must be burned. Young fowls may be raised safely indoors on the worst infested farms.



CHAPTER VI.

DISEASES OF THE HEART.

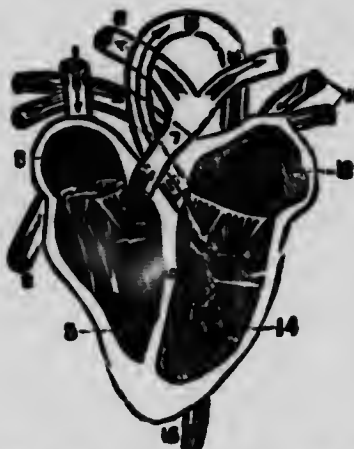
Frequency in different animals. General Symptom. Palpitation, thumps. Displacement of the heart. Cyanosis. Enlargement, hypertrophy. Wasting, atrophy. Dilation. Pericarditis, inflammation of the heart-sac. Endocarditis, inflammation of the lining membrane of the heart. Carditis, inflammation of the structure of the heart. Chronic disease of the valves. Fatty degeneration of the heart. Tumors and parasites of the heart. Rupture of the heart.

These are much more common in domestic animals than is generally supposed. Though protected in animals from the strain consequent on the upright position of man and excessive mental efforts, the heart suffers from the severe physical exertions of dogs and horses and in all animals from its contiguity to diseased lungs and pleuræ, from the increased force necessary to propel the blood through the lungs or general circulation when disease offers mechanical obstructions, and above all from the settling of rheumatism on its valves and other fibrous textures. Dairy cows suffer greatly from pins, needles, and other sharp-pointed bodies swallowed with the food and afterward directed toward the heart by its movements. High-bred oxen, sheep, pigs, and even pampered horses are very subject to fatty degeneration of the muscular substance of the heart and consequent dilatation of its cavities.

GENERAL SYMPTOMS OF HEART-DISEASE.—I. *The pulse* in full grown animals at rest may be set down as follows per minute:—horse 36 to 46; ox 38 to 42, or in a hot building or with full paunch, 70; sheep, goat, and pig 70 to 80; dog 80 to 100; cat 120 to 140; goose 110; pigeon 136; chicken 140. In old age it may be five less in large quadrupeds and twenty or thirty in small ones. Youth and small size imply a greater

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rapidity: The new-born foal has a pulse three times as frequent as the horse, the six-months colt double and the two-year old one and a quarter. It is increased by hot, close buildings, exertion, fear, a nervous tempera-



1, The descending vein. 2, The ascending vein. 3, The right auricle. 4, The opening between the right auricle and the right ventricle. 5, The right ventricle. 6, The tricuspid valves. 7, The pulmonary artery. 8, 8, The branches of the pulmonary artery that pass to the right and left lung. 9, The semilunar valves of the pulmonary artery. 10, The division between the two ventricles of the heart. 11, The pulmonary veins. 12, The left auricle. 13, The opening between the left auricle and ventricle. 14, The left ventricle. 15, The mitral valves. 16, 16, The aorta. 17, The semilunar valves of the aorta.

ment and pregnancy. In large quadrupeds there is a monthly increase of four to five beats per minute after the sixth month. Independently of such conditions a rapid pulse implies fever, inflammation or debility.¹ The

¹The pulse may be felt wherever a considerable artery passes over a superficial bone: thus on the cord felt running across the border of the lower jaw just in front of its curved portion: beneath the bony ridge which extends upward from the eye: in horses inside the elbow: in cattle over the middle of the first rib or beneath the tail: in dogs in a groove running down the inner side of the thigh.

force of the pulse varies in the different species in health, thus it is full and moderately tense in the horse; smaller and harder in the ass and mule; full, soft and rolling in the ox; small and quick in sheep; firm and hard in swine; and firm and with a sharp (quick) beat in dogs and cats. *In disease* it may become more *frequent*, *slow*, *quick* (with sharp impulse), *tardy* (with slow, rolling movement), *full*, *strong*, *weak*, *small* (when thread-like but quite distinct), *hard* (when with jarring sensation), *soft* (when the opposite), *oppressed* (when the artery is full and tense but the impulse jerking and difficult as if the flow were obstructed), *jerking and receding* (when with empty, flaccid vessel it seems to leap forward at each beat), *intermittent* (when a beat is missed at regular intervals), *unequal* (when some beats are strong and others weak), *irregular* (when without any distinct intermission for a period equal to an entire beat the intervals between successive beats vary in length). Beside these a peculiar *thrill* is usually felt with each beat in very weak, bloodless states.

Of these the jerking, intermittent, unequal and irregular pulses are especially indicative of heart-disease. The *jerking* pulse is associated with disease of the valves at the commencement of the great aorta which carries blood from the left side of the heart, and is accompanied by a hissing or sighing noise with the second heart sound. The *intermittent* pulse implies functional derangement of the heart but not necessarily disease of structure. The *unequal* and *irregular* pulse is met in cases of fatty degeneration, disease of the valves on the left side, cardiac dilatation, etc. A *retarded* pulse in which the beat of heart and pulse follow each other with a perceptible interval implies imperfect closure of the valves at the commencement of the aorta, or an aneurism on the aorta. A *venous* pulse seen in the jugular veins in the furrow near the lower border of the neck attends imperfect valves between the auricle and ventricle on the right side of the heart, or congested lungs but may exist in health.

Palpitation.—The application of the hand over the

chest behind the left elbow will detect any violent and tumultuous beating, irregularity in the force of successive beats, etc.

Auscultation.—The ear applied to the same part will detect a slight rubbing sound with each heart-beat in the early stages of pericarditis. It will also detect any modification of the heart sounds. In health each beat of the heart is characterized by two distinct successive sounds, the first somewhat dull and prolonged, the second short, sharp and abrupt. The first sound is simultaneous with the contraction and emptying of the ventricles, the closure of the valves between the ventricles and auricles and the flow of blood into the arteries. The second corresponds to the completion of these acts, the recoil of blood in the arteries and the closure of the valves between them and the heart. The following table will show the significance of the various superadded sounds (blowing, sighing, purring or hissing murmurs,) to any one who will acquaint himself with the course of blood through the heart:

BLOWING. HEART SOUNDS.

Blowing murmur before the first sound.		Narrowing of the auriculo-ventricular orifice. Clots or growths on the valves.
	Strongest toward the base of the heart. Heard along the large arteries.	Narrowing of the opening of the aorta.
Blowing murmur with the first sound.	Strongest toward the left of the heart. Not heard over the great arteries.	Narrowing of the pulmonary artery, or imperfect action of the auriculo-ventric- ular valves.
Blowing murmur with the second sound.	Doublerushing sound heard over the great art- eries at each heart beat.	Imperfect action of the valves at the opening of the aorta.
Blowing murmur after the second sound.	Doublerushing sound in the arteries with each beat of the heart.	Aneurism (dilata- tion) of the aorta.

Besides these the second sound may be doubled in hypertrophy of one ventricle of the heart.

The sounds are like whispered *who, awe, ss, or r*, very low but exceedingly characteristic.

Other Symptoms.—Besides the fever attendant on inflammatory affections there are characteristic phenomena present in the chronic form of heart-disease. These are shown at rest or only developed under exercise. There are habitually cold extremities, dropsies in the limbs, and beneath and within the chest and abdomen, difficult breathing especially during exertion, unsteady gait when hurried, vertigo, partial paralysis or cramps of the limbs. In most cases there is sluggishness, dulness, and a tendency to lay on fat. Patients may be lively when at rest, but flag at work and are liable to sudden fainting or death.

PALPITATION.—THUMPS.—This is sudden violent convulsive beating of the heart not connected with structural disease. Palpitations also accompany most acute diseases of the heart. The functional disorder comes on very abruptly, usually under some excitement, has perfect intermissions, is manifested by abrupt knocking and jerking of the abdomen with the heart-beats, by regularity in force and intervals of successive beats, and by the absence of redness of the mucous membranes, abnormal sounds of the heart and dropsy of the limbs. If connected with structural heart-disease it comes on more slowly, is constant though aggravated at intervals, with a heavy, prolonged or irregular and unequal impulse of the heart, with red mucous membranes and dropsy of the limbs. The first form is benefited by gentle exercise, stimulants and tonics, the latter aggravated by them. Some excitable horses and dogs suffer under any cause of fear, and pigs as a result of many acute diseases, (inflammations, intestinal worms, etc.)

Treatment.—Quiet, avoidance of all excitement, and sedatives (digitalis) thrice a day will usually arrest. Then the weak, excitable condition should be overcome by exercise, tonics and substantial feeding. In structural diseases these must be attended to as well.

DISPLACEMENTS OF THE HEART.—These are not very infrequent in the newly-born, the heart being sometimes lodged altogether out of the chest. There is no remedy.

COMMUNICATION BETWEEN THE TWO AURICLES.—**CYANOSIS.**—This is the natural condition before birth, but sometimes the directing of the blood through the lungs fails to secure its closure, or some obstruction to the circulation in these organs (tuberculosis, congestion, etc.,) leads to its re-opening and the arterial and venous blood mix. The blood being equally unfit for nutrition and the maintenance of animal heat, there is surface coldness, staring coat, puny growth, blue mucous membranes, and oppressed breathing and irregular heart's action when subjected to exertion. A murmur usually precedes the first heart sound. The subjects die young or prove worthless when mature. Nothing can be done to remedy unless the disease is due to some remedial affection of the lungs.

ENLARGEMENT (HYPERTROPHY) OF THE HEART.—This is a simple increase of the muscular substance and may be confined to one side of the heart or to one ventricle. It is usually caused by some obstruction to the circulation through the arteries, or in horses or dogs by habitual violent work.

Symptoms.—The heart's beats are more forcible and prolonged and the interval of silence shortened; the pulse is full and rolling; the first sound is low, muffled and prolonged, the second sound unnaturally loud, and sometimes repeated if one ventricle only is affected; the heart sounds may be heard over an unusually large area, the lungs being sound, and the dulness on percussion is equally extended. The pulse is usually regular, and if excited to irregularity or intermission soon returns to its normal standard if the patient is left at rest.

Pure hypertrophy rarely implies imminent danger, and many hard-worked horses survive to an old age with greatly enlarged hearts. But if associated with dilata-

tion, impaired strength, livid mucous membranes, blowing murmurs with the first heart sound, and paroxysms of difficult breathing, it may prove fatal at any time.

Treatment.—If possible remove the obstacle to the circulation. Then adopt a restricted, gently laxative diet, perfect rest in fattening animals or only light work in horses, and the daily use of digitalis or aconite, unless there is extreme dilatation. Arsenic is also given with benefit, but in advanced cases, or those due to irremediable obstruction, no treatment is of any avail.

WASTING (ATROPHY) OF THE HEART.—This is much less frequent than hypertrophy. It may be due to compression of the heart and its nutrient vessels by effusion into the pericardium, or the formation of false membranes, or it may coexist with a general wasting and imperfect nutrition of the body.

The *Symptoms* are the opposite of those of hypertrophy. There are the general signs of chronic heart-disease, but percussion which gives satisfactory results only over the breast-bone and in carnivora gives almost the sole reliable symptom—a decreased area of dullness. Little can be done to relieve, and that little directed to the removal of its causes. By keeping fattening animals quiet they may be preserved for slaughter.

DILATATION OF THE HEART.—This like hypertrophy usually results from some obstruction to the circulation, but especially from a sudden extreme obstruction. whereas hypertrophy results from a slowly increasing obstacle. It is also exceedingly common in cases of fatty degeneration in overfed stock (cattle, sheep, pigs).

Symptoms.—Loss of appetite, spirit and endurance, faintness and difficulty of breathing on the slightest exertion, habitual coldness of the limbs, dropsy, unsteady gait, venous pulse, palpitations, weak, tremulous heart impulse, murmur with the first sound, small, weak, irregular and often intermittent pulse, and lividity of the membrane of the nose.

Treatment.—Unless the causes can be put a stop to in the early stages no treatment will be satisfactory. Arsenic is sometimes useful in horses. Fattening animals should be kept very quiet and their progress hastened, if possible.

PERICARDITIS.—This is inflammation of the fibrous covering of the heart and its reflection on the pleuræ, and is due to similar *causes* with diseases of the lungs. It is also induced by influenza, pleuro-pneumonia, rheumatism, and wounds with sharp-pointed bodies (pins, needles, nails, broken ribs, etc.)

Symptoms.—General fever, staring coat, hot dry mouth, (muzzle, snout,) dilated nostrils, excited, difficult breathing, double lifting of the flank with each expiration, the formation of a ridge on the abdomen as in pleurisy, tenderness when pinched or percussed behind the left elbow (in ruminants and small quadrupeds over the breast-bone), a rubbing sound with each beat of the heart and the impulse of the heart strong. Soon effusion takes place, the rubbing sound is lost, the impulse of the heart and its sounds are weakened, and the area of dulness in percussion is increased. This dulness does not maintain a horizontal line along the chest as in hydrothorax, but is like an inverted cone and changes its position with a change of posture which is easily effected in small animals. Difficulty and oppression of breathing, protruded nose, staring eye-balls, pinched, haggard countenance, venous pulse and obstinate standing mark the advanced stages. Dropsies of the limbs and other dependent parts are also frequent. A painful cough is sometimes though not constantly present throughout the disease. Death may ensue in five days to three weeks, or the disease may become chronic or end in recovery.

The *chronic form* is seen in the ox without any preceding acute attack. There is slight fever, oppressed breathing aggravated by exertion, weak, irregular, intermittent pulse, distant heart sounds, absence of respiratory murmur, dulness on percussion over an increased, cone-like area behind the left elbow, venous pulse and general dropsy.

Treatment.—In the preliminary shivering, treat as for congested lungs. Later, bleeding may sometimes be beneficial in strong subjects by relieving extreme difficulty of breathing and high nervous excitement. Usually it would be injurious. Give a purgative (horse, aloes; ox and sheep, Glauber salts; dog and pig, castor oil,) foment the walls of the chest and envelop in a large mustard poultice until the skin is well thickened, moderate the heart's action by digitalis four times a day and follow the action of the purgative by diuretics (nitre, acetate of potassa, etc.) Ointment or tincture of iodine may be applied to the walls of the chest. In cases of extreme danger from effusion the liquid should be drawn off with cannula and trocar or needle-like tube, as in hydrothorax, the puncture in the horse or ox being made between the cartilages of the fifth and sixth ribs.

In case of rheumatic complication use alkalies, colchicum, acetate of potassa and other agents advised for rheumatism.

ENDOCARDITIS.—Inflammation of the serous membrane lining the chambers and covering the valves of the heart.

Causes.—Inflammation of the valves in connection with undue strain in severe exertions or obstructions to the flow of blood, the rheumatic constitution or certain other unhealthy states of the blood.

Symptoms.—The general symptoms resemble those of pericarditis. There are besides, violent but unequal impulse of the heart against the left side, accompanied by a metallic tinkling, a blowing murmur with the first, or even the second sound, as soon as the contraction of the valves or the clots formed on them, render them insufficient to close the orifices, and, if the disease exists on the right side of the heart, venous pulse, general venous congestion and dropsical swellings. The pulse, at first strong and sharp, becomes weak with the imperfection of the valves, in marked contrast with the continued strong impulse of the heart. The patient may perish from obstruction to the heart's action by clots on the

valves, or from such clots carried on with the circulation and blocking arteries at a distance ; or disease of other organs may supervene from the latter cause, or a recovery may take place with or without permanent alterations which render the valves unable to close their respective orifices.

Treatment is in the main the same as for pericarditis, rest, laxatives, sedatives and blisters being mainly relied upon. As there is less danger from effusion, diuretics need not be pushed to the same extent. In rheumatic cases, adopt anti-rheumatic treatment, and in case of clots on the valves use iodide of potassium and alkalies.

CARDITIS.—Inflammation of the muscular substance of the heart can only take place to a limited extent in connection with endocarditis and pericarditis, or with punctures from sharp bodies and the like. Were the entire organ involved death would be prompt. The *symptoms* are those of acute heart-disease generally, modified by the exact seat of the injury, and treatment need not differ materially from that adapted to the two diseases just described.

CHRONIC VALVULAR DISEASE.—With the general symptoms of chronic heart-disease, there are blowing murmurs as described in the table under *auscultation of the heart*. This is a very common result of endocarditis, and is irremediable. Yet affected cattle, sheep and pigs may often be prepared for the butcher by liberal feeding and perfect quiet.

FATTY DEGENERATION OF THE HEART.—This is most frequent in high-bred stock (Shorthorns, Berkshire and Essex pigs, Leicester and Southdown sheep,) but may exist in any pampered animal. Sometimes it is complicated by degeneration of the entire muscular system, especially in pigs. There are the general phenomena of chronic heart disease and dilatation, and the condition is irremediable, though it rarely kills animals kept in perfect quiet.

RUPTURE OF THE HEART.—If from severe exertion, this usually takes place through the fibrous structure at the base of the ventricles connecting them with the large arteries. If from a fall or violent concussion, the muscular walls usually give way, when found in a relaxed condition, or the laceration happens at the point of connection with the veins (*vena azygos*). Perforation from ulceration is seen in cows in connection with sharp-pointed bodies that have been taken into the stomach. Death is sudden in all such cases.

OTHER HEART DISEASES.—The heart is further subject to a great variety of diseased growths and deposits and to parasites—*Echinococcus*, *Cysticercus Tenuicollis* (sheep and calf), *Cysticercus Cellulosa* and *Trichina Spiralis* (pig), *Rainey's Cysts* (cattle), and *Filaria Immitis* (dog).

CHAPTER VII.

DISEASES OF BLOOD-VESSELS AND LYMPHATICS.

Wounds of arteries—punctured, cut, torn. Arteritis, inflammation of arteries. Embolism, plugging. Aneurism, dilatation. Wounds of veins. Phlebitis, inflammation of veins—circumscribed, diffuse. Varicose—dilated veins. Lymphangitis, inflammation of lymphatics. Weed. Poisoned and irritated wounds.

DISEASES OF ARTERIES.

WOUNDS OF ARTERIES.—*Punctured wounds* are rarely dangerous, as the walls quickly close and the few drops of blood which escape help to plug the orifice; but there is danger of inflammation and plugging of the vessel, and cold or warm fomentations with rest are desirable.

Cut wounds, if only implicating the outer coats, soon heal, and are rarely followed by dilatations as in man. If all the thickness of the wall is incised the result will be according to the direction. If in a line with the course of the vessel there is little risk, and slight pressure will usually check bleeding. If transverse or oblique the elasticity of the walls of the vessel holds the orifice open and bleeding is severe, the blood flowing in jets and of a bright red color. If cut completely across, the arterial coats retract and curl within themselves, and in small vessels will often close the opening.

To *check bleeding*, the end of the vessel may be sought and tied, or a piece of silver wire may be passed through to the soft parts beneath it by the aid of a curved needle, and tied over a cork placed on the surface of the skin. It may be untwisted and drawn out in twenty-four hours. Or a pad of tow may be made with a sharp firm point and gradually increasing to a considerable bulk (graduated compress) and tied over the wound with the narrow point pressing on the vessel. Or the orifice may be seared with an iron at a dull red heat.

Tearing, stretching, twisting and scraping through arteries usually lead to retraction of their coats and complete closure, and these measures are sometimes adopted to check hæmorrhage.

ARTERITIS.—Inflammation of an artery may be *external* or *internal* according as it affects the fibrous sheath or the inner lining membrane. In the *external inflammation* there may be little danger, even if matter is formed, as the vessel will continue to transmit the blood so long as its inner coat is sound. But in *internal inflammation* the blood coagulates, layer after layer, on its inner surface until the channel becomes impervious. This may cut off the blood entirely from the part to which the artery was distributed, leading to loss of power and substance, and in the case of the limbs to a lameness, which comes on whenever the animal is exercised, and increases with the exertion, but disappears with a short rest of ten or twenty minutes. Or small clots may be loosened from the mass and passing on block smaller trunks, causing circumscribed inflammation at distant parts.

Causes.—Over stretching of arteries. Plugging by clots from the heart in endocarditis, or from inflamed veins. Wounds, parasites, etc.

Symptoms.—Loss of muscular power and coldness of the parts beyond the seat of plugging, extreme tenderness over the line of the vessel at the inflamed point, and sometimes general fever.

Treatment.—Perfect rest, warm fomentations, laxatives, (horse, ox and sheep, linseed oil or Glauber salts; pig and dog, castor oil,) and afterward diuretics and sedatives.

The persistence of the plugging and lameness must be met by patience, the animal being turned into a small yard or paddock where he can take gentle exercise and live well, until the collateral vessels have had time to enlarge and carry on the circulation. Three or four months will sometimes secure a tolerable recovery.

DILATATIONS OF THE ARTERIES.—ANEURISMS.—These are mostly seen in the horse among domestic

animals, and even in him much more rarely than in man. The *causes* are generally severe strains in the vicinity of an artery, or over-stretching of the vessel itself. They are also common in the mesenteric arteries of horses from the presence of immature worms (*Sclerostomum Equinum*) in the circulating blood. Injuries to the walls of the vessels are much less liable to be followed by aneurism than in man, because of the greater plasticity of the blood, and the speedy formation of a covering of coagulable lymph. They are soft, fluctuating, pulsating tumors, effaceable by pressure, but reappearing at once. Being usually situated internally, treatment can rarely be adopted. But when superficial, compression has been most successful alike in the horse and dog. It is needless to recount the many other modes of treatment for such an unusual affection.

DISEASES OF VEINS.

WOUNDS OF VEINS.—These give rise to the escape of a dark red blood in a steady stream. This is commonly to be arrested by pinning up the lips of the wound evenly, taking hold of each by one-eighth inch and tying them together by a little tow, twisted round the two ends of the pin in the form of the figure 8. Or several pins may be placed near each other and the tow twisted round them and from pin to pin in the same manner. Veins may be tied, but this risks the occurrence of dropsy unless you know that there is a free circulation of other collateral trunks. They may be compressed for a time until the wound is closed with lymph, a simple pad and compress being used, or the silver wire and cork as advised for arteries.

PHLEBITIS. — INFLAMMATION OF VEINS.—This usually results from opening a vein with a rusty fleam or lancet, making the incision at the dilated part, just above a valve, pulling out the skin in inserting the pin so as to cause a flow of blood into the tissues beneath, leaving hairs or other irritants in the wound, or pinning the lips awry.

Symptoms.—Swelling of the wound, gaping and redness of the lips, and the formation of a hard painful cord along the line of the vein in an upward direction where the blood is necessarily stagnant and in contact with the clot already formed. The exudation may be fibrinous with a tendency to contraction and obliteration of the vein, or suppuration may occur, in which case the matter must escape externally. Clots may be detached and washed on to plug the arteries in the lungs, and rouse pneumonia, or perfect recovery may take place with loss of the vein, and a tendency to swelling of the part from which it comes, when that is in a dependent position.

Treatment.—If from an inflamed wound after bleeding, take out the pin, remove hair, pus, clotted blood or other irritant, and foment with warm water. Then rub in, at an inch distant from the wound and along the course of the hardened vein, an active blister (Spanish flies 2 drs., lard 1 oz.) and tie the animal to the two sides of the stall, so that he cannot rub the part. If a vein is lost in the neck, never again turn out to grass.

DIFFUSE PHLEBITIS.—Resulting from an irritated or poisoned external wound, or in the wound after parturition, is usually fatal, the clots forming on the inflamed lining membrane being washed on in greater or less amount, to set up inflammation in the lungs and elsewhere.

DILATED (VARICOS.) VEINS.—These are common over the distended hock joint in bog spavin, and I have seen them in the posterior tibial and other veins, but they are rarely or never injurious.

ENTRANCE OF AIR INTO VEINS.—If veins are opened in the lower part of the neck or elsewhere in the vicinity of the chest the suction-power may draw in air in such quantity as to work the blood in the heart into a frothy mass, and block the minute vessels in the lungs, causing sudden death. There is heard a gurgling sound as it

enters the vein and afterward tumultuous heart's action and a fine squeaking sound in the lungs, while the animal falls in a faint. The danger is not so great as is usually supposed, as it takes several quarts suddenly introduced to kill a horse. Care is requisite, however, to close promptly all large veins opened in the vicinity of the chest.

DISEASES OF THE LYMPHATICS.

LYMPHANGITIS—INFLAMMATION OF THE LYMPHATICS.—This occurs in two forms, one a constitutional disease and the other a simple local affection due to irritation of a wound or the absorption of poisonous matter.

X **CONSTITUTIONAL FORM—WEED—SHOT OF CREASE**
—This is seen mainly in heavy lymphatic fleshy-legged horses, kept at hard work on heavy feeding, and in the midst of this left in the stall for two or three days without any exercise or change of feed. Thus it is common on Monday morning or after one or two stormy days that have kept the horses in doors. It is the result of a sudden access of plethora, but it may occur in similar circumstances in over-worked and rather reduced horses. In either case it is due to an accumulation in the blood of deleterious products that should have been worked off by exercise.

Symptoms.—There is shivering to a variable extent, but very severe in the worst cases, greatly accelerated breathing, rapid hard pulse, general fever and stiffness in one or both limbs. Examination high up in the groin, by the side of the sheath or udder, detects enlargement and great tenderness of the inguinal glands, the patient usually raising and drawing out his limb till he seems ready to fall over on the other side. Soon the shivering gives place to the hot stage, the surface burns and sweats, and the limb swells, the swelling extending cord-like down the course of the vessels on its inner side, and its lower part becoming the seat of an excessive exudation, which may fill up to the body, and of

two, three or four times its natural size. If allowed to go on, abscess, sloughing and unhealthy sores may result, the patient may perish, or the fever may subside, leaving the limb permanently thickened to almost any extent, and correspondingly liable to future attacks.

Treatment.—Mild cases may be entirely restored by giving the animal a fair amount of exercise. In those that are somewhat more severe, a smart purgative (aloes 6 to 8 drs.) must be given, warm fomentations applied continuously to the limb, and walking exercise enforced as soon as the patient can be made to move. The purgation should be followed up by active diuretics (nitre, iodide of potassium,) and when the inflammation has somewhat subsided tincture of iodine may be applied over the swollen glands. In the worst cases in vigorous plethoric subjects a prompt effect should be secured by a free bleeding from the jugular, until the pulse is softened, and the same treatment followed out as in other cases. Diet should be light and laxative (bran-mashes, roots, scalded hay, etc.,) and the water given with the chill off.

For the chronic thickening of the leg, regular feeding and exercise, a bandage smoothly applied from the foot up when in the stable, the application of tincture of iodine every four days to the limb, and the internal use of tonics (iron, Peruvian bark, columba, gentian, nux vomica, etc.,) and diuretics (iodide of potassium, liquor of acetate of ammonia,) will be beneficial. Some use veratrum.

LOCAL FORM.—This results mainly from wounds, bruises (saddle or shoulder scalds), from injuries of unyielding parts (pricked foot, tendon or fascia), and above all from the absorption of putrefying animal matter or other poison by these vessels. The same occurs from the specific poisons of glanders, farcy, etc. There are slightly swollen cords (red in white skins) extending along the course of the lymphatics and veins from the point of irritation or poisoning; nodular painful enlargement of the lymphatic glands along their course, and

more or less surrounding pasty swelling or even erysipelas. It may go on to abscess or diffuse suppuration, it may leave induration of the glands, or even the vessels and surrounding parts, or a perfect recovery may be made.

Treatment.—Rest, a purgative, and astringent lotions (acetate of lead 1 dr., opium $\frac{1}{2}$ dr., carbolic acid 1 dr., water 1 qt.) If the inflammation runs very high it may be expedient to use warm poultices to hasten suppuration. In case it arises from a poisoned wound, cauterize the sore thoroughly with lunar caustic or crystallized carbolic acid, and keep the affected parts wrapped in cloths constantly wet with a saturated solution of bisulphite or hyposulphite of soda, and enough carbolic acid to give a sweetish taste. The bisulphite may also be taken internally. In case of suppuration, open early and freely with the lancet. If the affection becomes chronic and threatens permanent induration use iodine ointment or tincture, well applied bandages, giving an equable pressure, and even blisters. Iodide of potassium, or in weak subjects, iodide of iron, may be given internally.



A SICK HORSE

CHAPTER VIII.

DISEASES OF THE DIGESTIVE ORGANS.

Their frequency and gravity in different animals. Stomatitis. Inflammation of the mouth—of the palate—of the gums—of the tongue. Thrush, Aphthous Stomatitis. Mercurialism. Wart on the lips. Laceration of the tongue. Cysts under the tongue. Tumors of the mouth. Cancroid of the lips. Cancer of the tongue. Supernumerary teeth. Wolf teeth. Parrot-mouth. Crib-biting, wind-sucking. Displaced teeth, overgrown and uneven teeth. Carious teeth. Disease of the membranes of the teeth. Tartar on teeth. Dentition-fever. Salivation, slobbers. Salivary calculi. Salivary fistula. Inflammation of the parotid gland. Choking. Stricture and dilatation of the gullet. Impaction of the crop. Tympany in cattle. Hoove. Bloating. Overloaded paunch. Impaction of the third stomach. Gastritis in cattle. Indigestion in oxen. Indigestion in calves, lambs and foals. White scour. Acute gastric indigestion in the horse. Acute intestinal indigestion in the horse. Windy colic. Impaction of the large intestines in horses. Chronic indigestion—catarrh of the stomach and bowels in horses. Vomiting. Depraved appetite. Foreign bodies in the stomach and intestines. Spasmodic colic. Acute hæmorrhagic enteritis. Acute muco-enteritis. Croupous enteritis. Inflammation of the rectum. Diarrhoea, scouring. Dysentery. Obstruction of the bowels—impaction, invagination, volvulus, etc. Hernia—diaphragmatic, mesenteric, umbilical, inguinal, femoral, ventral, vaginal. Eversion of the rectum. Piles. Fistula in anus. Imperforate anus. Peritonitis. Ascites. Gastric and intestinal parasites.

DISEASES OF THE DIGESTIVE ORGANS.—The importance of these diseases in the domestic animals follows an ascending series from the carnivora, through the omnivora and solipeds to the ruminants. The small capacity of the digestive organs in carnivora (dog and cat), the completion of the greater part of the digestive process in the stomach, and the facility with which vomiting is accomplished sufficiently account for their comparative immunity. Pigs stand next in these respects, and last come the herbivora, with their enormously long and capacious digestive organs, the slow digestion as the food passes through the bowels, and the difficulty or

impossibility of getting quit of irritating agents by vomiting. In the ox and sheep there is the further complication of the four stomachs, the first three of which are little more than macerating and triturating cavities, and in which an enormous bulk of food is continually stowed away. From their rapid collection and swallowing of food, poisonous, irritating and unnatural objects appear more liable to be taken in by oxen, while horses suffer more from hurried feeding and from hard work immediately after feeding. Horses, too, suffer much from faults in watering, as excess of cold water when hot and fatigued, causing stomachic and intestinal congestions, an excess after feeding grain, washing that on undigested to ferment in the bowels, etc. Again, all of the herbivora are especially subject to digestive disorders from food that is unnaturally grown, or spoiled in harvesting, so that in unfavorable seasons affections of the stomach and bowels may spread like an epizootic.

INFLAMMATION OF THE MOUTH.—Causes.—Mechanical and chemical irritants. There may be wounds, bruises, injuries with bit or switch, irritant vegetables, scalding food, snake and leech bites, stings of insects, injuries from ropes tied round the lower jaw and tongue, from giving "weak lye" and other irritants, especially to the horse, which can resist swallowing liquids as long as he chooses, from pricks with thorns, needles and other sharp-pointed bodies, from cutting, decay, over-growth or irregularity of the teeth, from rough dragging upon the tongue, from the use of mercury and other salivating drugs, from parasitic growths, and from some specific fevers (aphthous fever, rinderpest, etc.)

Symptoms of General Inflammation of the Mouth.—Difficulty in taking in food and water; swollen, rigid, tender lips and cheeks; red membrane of the mouth; salivary; saliva often foetid; swelling between the bones of the lower jaw; the formation of blisters or sores inside the mouth; and sometimes swelling of the glands beneath the ears. Abscess or even gangrene may result.

Treatment.—Remove the cause, whether irritants in food, drugs, sharp bodies lodged in the tissues, injuries by the bit, twitch, or otherwise. If injured by lye, wash with weak vinegar; if by acids with calcined magnesia, lime water or bicarbonate of soda; if by caustic salts, white of egg, boiled linseed, slippery elm or the gluten of wheat flour. Give the same agents as a draught. If from the bite or sting of venomous animals apply ammonia to the part and give it internally. In all the severer animal poisons the wound should be cauterized (see *canine madness*). In simple inflammations open the bowels by injections of warm water with soap or other laxatives, or, if it can be done, give a mild laxative (olive oil). Wash the mouth frequently with cool astringent lotions (vinegar and water; vinegar and honey; borax, alum or tannic acid, honey and water; water slightly sweetened with carbolic acid, etc.) Have fresh, cool water constantly near to drink at will, and feed with boiled gruels, or soft mashies cold, or pulped or thinly sliced roots. Poultices beneath the throat and lower jaw are often very useful. If erosions and ulcers appear touch them repeatedly with a feather dipped in a solution of 10 grains lunar caustic to 1 oz. distilled water. If fluctuation shows the presence of matter, lance at once. If sloughing takes place wash with a solution of permanganate of potassa 1 dr., water 1 pint. If there is much swelling keep the head tied up.

CONGESTED PALATE.—LAMPAS.—A red, swollen state of the soft parts behind the upper front teeth, attendant in young animals on shedding of the teeth, or in older ones on digestive disorder. The taking in of food may be painful and awkward from the tender palate projecting beyond the teeth.

Treatment.—Feeding hard unshelled Indian corn has often a good effect. Scarify slightly with knife or lancet for half an inch back from the teeth. Follow with astringent lotions if necessary. If with costiveness or disorder of the stomach give a dose of physic.

INFLAMMATION OF THE GUMS.—If connected with the shedding and cutting of teeth, remove those that hang partly detached and scarify the gums. For the other causes—diseased teeth and mercurial poisoning—see below.

INFLAMMATION OF THE TONGUE.—There are signs of general inflammation of the mouth, with great difficulty in taking in food, chewing and drinking, and a swollen red tender state of the tongue, which often hangs out of the mouth.

Treatment.—Search carefully for any sharp irritant body that may have penetrated the organ and remove it. Support the tongue within the mouth in a bag with tapes tied behind the ears. Otherwise treat as for general inflammation of the mouth.

THRUSH OF THE MOUTH.—**APHTHOUS STOMATITIS.**—**MUGUET.**—Is mostly seen in sucking animals. In addition to the signs of ordinary inflammation, there appear on the lips, cheeks and tongue, firm white patches, which on microscopic examination show the presence of a vegetable growth (*oidium albicans*). Wash the mouth frequently with a solution of bisulphite of soda or even of borax.

MERCURIALISM.—Inflammation of the mouth, ulceration of the gums, loosening of the teeth and free salivation were formerly common results of the abuse of mercurials, but are now fortunately rare. There is likely to be disorder of stomach and bowels, loss of appetite, bloating, rumbling in the belly, badly digested foetid stools, and great languor and depression. Use washes containing tincture of iodine or chlorate of potassa, and iodide of potassium internally.

WARTS ON THE LIPS are very common in dogs. Remove with scissors, and cauterize the roots thoroughly with a pointed stick of lunar caustic.

LACERATION OF THE TONGUE.—*Causes.*—Especially common in horses from hard bits, roses of ropes, or rough dragging with the hand. The lacerated tongue may hang from the mouth. Sew up the wound with catgut previously softened in water; feed thick gruels only, and wash out the mouth frequently with a lotion of permanganate of potassa. Any dead portion must be removed with the knife, but it must not encroach on the living. The whole organ may often be saved when almost entirely torn off.

CYSTS UNDER THE TONGUE.—These are tense elastic rounded swellings, and are easily remedied by a free incision with the knife.

TUMORS IN THE MOUTH.—These mostly grow from the gums and tongue, and may attain the size of the closed fist in the horse. Small ones may be removed with scissors, the larger with the *acrasour*.

CANCROID OF THE LIPS.—CANCER OF THE TONGUE.—The former of these attacks the angle of the mouth in horses and cats as an eroded unhealthy sore with hard thickened margins; the latter appears in horses and cattle as an increasing hard swelling with unhealthy open sore and giant cells. It should be excised when very limited. Later it is incurable.

SUPERNUMERARY TEETH.—In the case of nippers or grinding teeth these should be extracted or pinched out, as they are liable to injure the gums, palate, cheek, or tongue.

Wolf-teeth cannot be looked on as superfluous, being natural and harmless. They are insignificant teeth situated directly in front of the upper, and less frequently of the lower grinders. Being present during the shedding and cutting of the teeth, when recurring inflammation of the eyes is most frequent, they are in very bad odor with people who cannot see the distinction between the mere coincidence and the cause and effect. They are useless,

however, and may be extracted without injury, though if broken they may irritate the gums.

PARROT MOUTH.—Abnormal length of the upper jaw may lead to inordinate length of the upper front teeth, which project over the lower like a parrot's bill. If this interferes with grazing the extra length should be removed with a saw or with *tooth-shears*. But parrot-mouthed horses usually do well fed in-doors.

CRIB-BITING.—This is a distortion rather than a disease of the teeth, these being worn away on their anterior



MUZZLE FOR CRIB-BITER.

edge so as to show more or less of the yellow dentine in place of the clear pearly enamel. It is associated with the serious vice of *wind-sucking* (swallowing), and eructation, which leads to tympany, digestive disorder, and rapid loss of condition. The horse seizes the manger or other solid object with his teeth, arches and shortens the neck, and makes a grunting noise. The *wind-sucking* may, however, exist without *crib-biting*. It may be learned by standing idle near a *crib-biter*, and always goes on to disease and loss of condition.

Treatment.—Smear the front of the manger with aloes or other bitters. Cover all exposed woodwork with sheet-

iron. Place a small revolving roller above the front of the manger, so that the teeth may at once slide off. Apply the muzzle shown in the adjoining cut. In pure *wind-suckers* a strap may be tied tightly round the upper part of the neck, though at the risk of inducing roaring.

DISPLACED TEETH.—Though loosened and partially displaced, teeth will often grow firm if at once replaced in their sockets and the animal fed for some time on soft mashes. If they cannot be returned to their natural situation they should be at once extracted, as any faulty direction will be a source of after trouble.

OVERGROWN AND UNEVEN TEETH.—The teeth of herbivora are liable to be overgrown into sharp hurtful processes along the outer margin of the upper grinders or the inner border of the lower, because the lower jaw is always narrower than the upper. In old animals and those having broken teeth, extensive over-growth will ensue from the absence of wear. In other cases a tooth is displaced and failing to meet with a tooth in the other jaw, gets overgrown, cuts the soft parts, and sets up disease of these or of the jaw-bone. There ensue the usual symptoms of disease of the teeth, with swelling of cheek or tongue, tumefaction of the jaw or even a running sore, or a foetid discharge from the nose. The overgrown teeth must be reduced with the tooth-rasp, cut with tooth-shears, or with a guarded tooth-chisel.

CARIOUS TEETH.—Caries is quite common in the grinding teeth but rare in the incisors.

Symptoms.—Slow, careful mastication, and dropping from the mouth of half-chewed food (hay, green fodder,) which, impelled by hunger, the animal takes in but fails to swallow. Greedy swallowing of soft food, indigestions and colics from imperfectly chewed aliment irritating the stomach and bowels. The presence in the dung of undigested grain which has been swallowed whole. Unthrifty, staring coat, *hide-bound*, pale mucous mem-

drane, weak pulse, weakness, emaciation, and liability to sweating, and swelling of the legs are marked features. The more specific symptoms are: swelling of the jaw-bone over the diseased fang or even a running sore if in the lower jaw, the accumulation of partially chewed food around the tooth, and especially between it and the cheek, tenderness of the tooth when touched or gently tapped with the finger, the presence of a black spot on some part of its surface, or of an excavated channel, leading from the wearing surface down to the fang, or between the tooth and the jaw-bone, this cavity being filled with putrid elements and giving out a most offensive and persistent odor. In some cases the tooth is broken in pieces. In examining the mouth draw out the tongue and turn it up between the jaws, or better keep the jaws apart with a balling iron. If the diseased tooth belongs to the upper jaw and is behind the first grinder there may be a very foetid discharge from the nose, which with its attendant nodular enlargement of the glands beneath the jaw have led to the destruction of many such horses as glandered.

Treatment.—When there is much inflammation of the gums clear out the cavity of the tooth with the aid of a bent flattened wire and a syringe with bent nozzle, feed soft bran mashes only, and give a dose of laxative medicine (horse, aloes; ox or sheep, sulphate of magnesia; dog and pig, jalap;) lance the gums and protect from cold for a few days. When inflammation is less severe, scrape from the diseased cavity all black, softened or diseased tooth, and plug it with gutta-percha softened by heat, moulded into the cavity and hardened by a stream of cool water. If there is a tender spot from exposure of the nerve this should first be deadened by caustic (crystallized carbolic acid and powdered opium). Where the destruction is too great to allow of success by stuffing, the tooth must be extracted, and the cavity syringed out after each meal, until it heals up, and then filled with gutta-percha to prevent the adjacent teeth deviating from their proper direction. If very loose, the grinding teeth of large quadrupeds may be extracted

with large tooth forceps, but if at all firm an opening must be made over the fang and the tooth driven into the mouth with a mallet and punch. This operation requires accurate anatomical knowledge, especially in young animals. In small animals the teeth may be removed by ordinary dentist's forceps. After the removal of a tooth in herbivora the opposing teeth on the other jaw must be occasionally cut or rasped down to prevent injury from overgrowth.

DISEASE OF THE MEMBRANES OF THE TEETH.—The membrane surrounding the fang or that lining the pulp cavity may become the seat of disease. There may be loosening, suppuration or shedding of the tooth, deviation from its true direction so that the outer edge of the upper grinder or the inner edge of the lower may get overgrown and injurious, or a hard deposit may fill up the pulp cavity, or surround the fang wedging it into its socket and setting up disease and swelling of the adjacent jaw-bone. These conditions may often be relieved in the early stages by soft feeding, protection from cold, lancing the gums, a dose of physic, and daily sponging of the gums with tincture of myrrh.

DENTINAL TUMORS.—These occur from the action of any irritant applied to the tooth ivory. Some years ago I removed a large mass of this kind attached to the second upper temporary grinder of the horse. It is usually necessary to remove the teeth from which they grow.

TARTAR ON TEETH.—This is common in dogs and may be removed by a wooden probe with a small pledget of tow dipped in water rendered slightly acid with spirit of salt.

DENTITION FEVER.—Considerable irritation and fever often attend on the cutting of the teeth in animals. Horses are most liable to suffer in the third year when they cut four front teeth and eight back ones, and in the

fourth year when they cut four front, eight back, and four tushes. Cattle suffer less and mainly from the second to the third year. One of the first grinders which come up at this period is sometimes entangled with the crown of its predecessor, causing much loss of appetite and condition and foetid breath. Pigs usually cut thirty-six teeth from the sixth to the twelfth month, and are most liable to suffer at this age. Puppies and kittens suffer even to convulsions, between the third and the sixth months. The temporary tushes should always be extracted, if not shed, before the permanent ones come up.

The redness, swelling and tenderness of the gums in such cases may extend to the throat, causing fits of coughing, and retained temporary teeth are to be sought for and removed. Otherwise treatment consists in a slight lancing of the gums, washing with tincture of myrrh, using soft food, keeping the bowels open, and avoiding hard work in horses and dogs.

SALIVATION—SLOBBERS.—This is often a symptom of some other affection (aphthous fever dumb rabies, epilepsy, stomatitis, pharyngitis, dentition, caries, and other diseases of the teeth, wounds and ulcers of the mouth, gastric catarrh, etc.) all caused by irritant food and drugs (rank aqueous rapidly-grown grass, musty mow-burnt fodder, lobelia, wild mustard, colchium, pepper, garlic, ginger, irritants, caustic alkalies, acids and salts, and the compounds of mercury used internally and externally). Mercurials are especially hurtful to cattle. Paralysis of the lips will cause a free flow of saliva, as will also irritation with the bit, and especially from chemical agents attached in bags to the bit.

Symptoms.—Free discharge of saliva in stringy filaments or frothy masses, frequent deglutition, increased thirst and disordered digestion. For mercurial salivation see *stomatitis*.

Treatment.—Discover and remove the cause, use astringent washes as advised for stomatitis, and give access to cold water. In obstinate cases give a course of tartar

emetic, opium, chlorate of potassa, or iodide of potassium. Rub the glands beneath the ears and between the jaws with iodine of ointment.

SALIVARY CALCULI.—These are small concretions of earthy and organic matter usually around some foreign body (a grain of oats or barley, or a particle of sand) which has accidentally entered the canal. They obstruct the ducts and give rise to the feeling as of a tense elastic cord extending round the border of the lower jaw and upwards on the side of the cheek, or forward along the inner side of the jaw-bone. The pea-like concretion may be felt at the anterior end of the cord, and if there is more than one they may be made to rattle on each other. Sometimes matter forms and bursts and the concretion may be felt in the depth of the wound. Difficulty in chewing and swallowing, and indigestions arise from the lack of saliva.

Treatment.—Pass the calculus onward to the mouth by manipulation with the fingers, or this failing lay open the duct and extract it from within the mouth if possible. If it must be opened through the skin, first shave the part, make a small incision with a sharp knife, extract the mass and cover the wound with layer after layer of collodion, allowing as little exposure to the air as possible. Allow no food whatever for twelve hours, and then only soft mash and gruels until healing is completed.

SALIVARY FISTULA.—This is found wherever a wound penetrates a duct of any of the salivary glands. It is especially liable to occur from opening abscesses in strangles and from wounds about the lower jaw.

Symptoms.—A free discharge from the wound during feeding, of a clear, slightly glairy liquid, especially abundant where the food is dry and fibrous. Chewing is slow, difficult, and carried on on the opposite side of the mouth only. Digestion and general health are gradually impaired.

Treatment.—If recent, shave the edges of the wound, bring accurately together and cover with collodion.

layer after layer, until strong enough to prevent it from bursting open. If of older standing, a smart blister over and around the wound will often close it. Should this fail, the edges must be made raw by paring and the wound firmly closed by carbolated catgut or twisted suture. If the channel between the wound and the mouth has become impervious, a new one must be made and kept open by a thread passed through it and retained by being fixed to a flat button outside and in, until the walls are no longer raw and likely to adhere. Then the thread is to be withdrawn and the external wound closed by stitching, blister or collodion.

In all such cases the patient must be tied to both sides of the stall, high up, so that he cannot possibly rub the wound, and diet must be restricted absolutely to soft mash and gruels.

In obstinate cases a forcible injection into the duct of the gland of a solution of 2 grs. lunar caustic in 1 oz. of alcohol, will usually destroy its secreting power.

INFLAMMATION OF THE PAROTID GLAND. — This gland, situated behind the ear, is liable to inflammation from mechanical injury and obstruction of its duct, as well as in strangles and other specific diseases.

Symptoms.—A hard but painful tumefaction beneath the ear, with more or less soft doughy feeling at its margins, stiff carriage of the head, slow, difficult chewing, and more or less general fever.

Treatment.—First remove any obstruction in the duct or mechanical cause of irritation, then purge (Glauber salts), wash the mouth with weak solutions of vinegar or chlorate of potassa, and cover the affected gland with a soft poultice, with a little sugar of lead added. Feed soft cool mash and sliced or pulped roots only, and when the bowels have settled give cooling diuretics (nitrate of potassa). If matter forms let it approach the surface and point before opening, to avoid cutting any of the ducts and establishing a fistula. If it gets hard and insensible, use iouine externally and internally.

CHOKING.—This is especially common in cattle feeding on roots, potatoes, apples, pears and the like, because of the habit of jerking up the head to get the object back between the grinders. Pieces of leather, bone, etc., chewed wantonly often slip back in the same way. Horses suffer mainly from badly shaped balls or sharp-pointed bodies, dogs from bones. Ravenous feeders will choke on dry chaff, cut hay, etc., being imperfectly mixed with saliva, and the same will happen in cases of diseased teeth or salivary fistula or calculus.

Symptoms of pharyngeal and cervical choking.—When the object is arrested in the throat or neck there is great distress, staring eyes, slaving, violent coughing, with expulsion of dung or urine, continuous efforts at swallowing, and in cattle tympany of the first stomach, which may suffocate the animal in fifteen or twenty minutes. I have seen an animal die in five minutes when the object was lodged directly over the opening of the windpipe. In horses there is in addition an occasional shriek, and water returns by the nose when drinking is attempted. In omnivora and carnivora retching and vomiting are prominent symptoms. A careful examination along the furrow on the left side of the neck will usually detect the offending object.

Symptoms of thoracic choking.—If the object is lodged in that part of the gullet which lies within the chest, cough, slaving and gulping may be absent, but there are efforts at regurgitation and the discharge of liquids by the mouth (in horses the nose). This, with the inability to swallow solid food, is very characteristic. Tympany is usually slight, and there may be tremors at intervals.

Symptoms of choking with finely divided dry food.—These are the same as for solid masses, according to the situation, but in addition there is in the groove on the left side of the neck, a diffuse soft yielding swelling provided the obstruction is situated above the chest.

Treatment.—Sharp-pointed bodies lodged in the throat must be carefully sought for and extracted. Solid objects in this region can usually be withdrawn with the

hand. Have the animal held with the head elevated into a line with the neck and the mouth held open with a balling iron; then the tongue being drawn out with the left hand, the right is passed through the mouth into the throat by pressure beneath it with one hand in each furrow along the lower border of the neck. A vigorous jerk at the last second by the action of the pharynx will often lodge it in the mouth, but if not it is easily extracted as above advised.

Should this fail and tympany prove threatening lose no time in gagging the animal. A smooth roller of wood two inches in diameter is tied into the mouth by cords carried from its ends around the top of the head—behind the horns in cattle. Swelling never increases dangerously with this applied, and in a few hours the obstruction usually passes on.

More prompt relief may be obtained by using a probang of leather or other material with a spiral spring wire internally, the whole two-thirds of an inch in diameter, six feet long, and with one end enlarged to one and a half inches in diameter and cup-shaped. This is oiled and the head having been brought into a line with the neck, the balling iron introduced and the tongue drawn out, the cup-shaped end is introduced and pushed on until the obstruction is reached. Steady pressure must be kept up on this for a few seconds, when it will yield and should be passed into the stomach by introducing the probang to its whole length. If it resists, leave the animal for an hour or two gagged, and try again. In the horse the probang cannot be safely passed without casting, and it should never be passed on until by examination in the furrow on the side of the neck, the operator has ascertained that it has entered the gullet and is clear of and above the windpipe. For the small animals the probang must be made correspondingly small.

The use of whips and such like objects is very reprehensible, as being liable to tear the gullet. An effective probang may be constructed out of a piece of stiff new rope, a few of the bundles of the end of which have been opened out and tied back so as to form a cup-shaped ex-

tremity. After being used, this may be hung up straight on several nails driven into the wall, and will be ready for the next occasion.

In choking with finely divided food the probang only packs it firmer, and gagging and time will rarely dislodge it. Pour water or well-boiled gruel down, and seek by manipulation to break up the mass and allow it to pass on little by little. Instruments have also been devised for extracting the obstructing mass. Failing otherwise, the gullet must be laid open, the offending matter extracted, the wounds sewed up, and the animal fed for a time on liquids only.

Horses are sometimes choked by eggs given by foolish grooms. These may be punctured with a needle and then crushed between two solid bodies on different sides of the neck.

Prevention.—Besides the more obvious resort of withholding dangerous articles, the mere tying down of the head will prevent choking in cattle feeding on turnips, apples, &c. A loop of rope fixed to the ground is to be hung over the horn when such food is supplied. Solid food should be to a large extent withheld for a week after the relief of choking, until the slight irritation or inflammation has subsided.

STRICTURE AND DILATATION OF THE GULLET.—These usually co-exist, the first giving rise to the second, because of habitual accumulation of food above the narrow part. The narrowing results from mechanical injury in choking, etc., or from the presence of a worm (*spirop-tera*) which lives in galleries on the mucous membrane.

The *symptoms* are the formation of an extended diffuse soft swelling along the furrow on the left side of the neck when the animal feeds or drinks, and the subsidence of this swelling during abstinence. The only permanent treatment is by bougies or probangs passed daily, beginning with those that will just pass the stricture, and using them larger as the former ones begin to pass easily. The food must be restricted to soft mash and gruels. Cattle are usually slaughtered when attacked in good condition.

IMPACTION OF THE CROP IN BIRDS.—Symptoms.—Want of appetite, dulness, sinking of the head between the wings, ruffled plumage, and enormous and firm distension of the crop, easily recognized when the bird is handled.

Treatment consists in pouring down tepid water and moulding the crop so as to force its contents a little at a time back into the mouth. This failing, cut the crop open, empty it, sew up the wound, and feed gruels or soft mush for a few days.

TYMPANY OF THE FIRST STOMACH IN RUMINANTS—HOOVE—BLOATING.—Causes.—It is especially common in weak, ailing, or underfed stock when put on rich luxuriant food, especially green food, in spring. Some food is dangerous, such as clover (white and red); green food covered with dew or hoar frost, soaked by inundations or drying after a shower; diseased or frosted potatoes or turnips (roots or tops); partially ripened but uncured grain and crowfoots and other acrid plants. It may be caused by overloading the stomach with sound fodder, by the presence of hair-balls and other foreign bodies in the stomach, by fever, choking, stricture or parasites in the gullet, tuberculosis, etc.

Symptoms.—Swelling of the whole left side of the belly, often rising above the level of the hips and backbone, tense and elastic, recoiling at once when pressed in, and drum-like on percussion. There is great difficulty of breathing, distended nostrils, bloodshot eyes, open mouth, driveling of saliva, occasional belching of gas with loud noise, and frequent passage of dung and urine. The patient stands to the last, and falls to die with ruptured diaphragm or stomach, congested lungs, and profound nervous shock.

Treatment.—Gagging is alleged to succeed as in choking, but I have not tried it. Dashing a bucket of cold water on the body may give temporary relief by condensing the gas and favoring eructation. The hollow probang passed into the stomach, as for choking, will allow the escape of the gas. In urgent cases the paunch

must be punctured with the first instrument that comes to hand, and the openings in the stomach and skin kept in apposition until the gas flows out. The most suitable instrument is a cannula and trocar, at least six inches long, which may be plunged without fear in the left side, in a downward and inward direction, from a point equidistant from the hip bone, the last rib and the lateral processes of the backbone. The trocar being withdrawn the canula may be tied in and left for hours or days. In the absence of these a pocket-knife may be used, and should be kept in the wound until a large quill can be obtained and held in its place. A small trocar like that used for hydrothorax in horses is suitable for sheep and goats.

When urgent cases have been relieved in this way, and in milder cases without any such surgical resort, antiferments and antacids must be given; aromatic spirit of ammonia, (ox 3 oz., sheep 1 oz.,) crystalline sesquicarbonate of ammonia (ox 1 oz., sheep 3 drs.,) oil of turpentine (ox 2 oz., sheep $\frac{1}{2}$ oz., in oil, milk or eggs well mixed,) whisky, brandy or gin (ox 1 to 2 pts., sheep $\frac{1}{2}$ pt.,) ether, pepper, ginger, oil of peppermint, etc., in full doses, wood tar (ox 2 oz., sheep $\frac{1}{2}$ oz.,) carbolic acid or creosote (ox 2 drs., sheep $\frac{1}{2}$ dr. in a pint of water,) sulphite, hyposulphite or bisulphite of soda (ox 1 oz., sheep 2 drs.,) chloride of lime or chlorate of potassa. Antacids (potassa, soda, ammonia, and their carbonates; soap-suds and lime-water,) check the fermentation by neutralizing the acidity. Care should be taken to see (by tasting) that they are not used in too strong and irritating solutions.

A dose of physic is usually necessary to clear off the offensive food, and should be accompanied by a stimulant (sulphate of soda and ginger).

Chronic tympany, due simply to indigestion, may be remedied by careful dieting and a course of tonics, (fœnugrec, oxide of iron, carbonate of soda and common salt in equal parts, nux vomica, 2 drachms to every pound of the mixture. Dose: ox 1 oz., sheep 2 drs., daily in food).

For *chronic tympany*, due to foreign bodies in the paunch, see below.

OVERLOADED PAUNCH.—This differs from the last in that the paunch is overloaded, overstretched and paralyzed by excess of solid food, rather than gas. Rich, tempting and unusual food (luscious grass, clover, lucern, vetches, tares, beans, peas, grain,) is especially dangerous, as is food which ferments with the formation of a fine, frothy mass, (potatoes, especially diseased or frosted ones,) food containing a narcotic or paralyzing principle, (green Indian corn, partially ripened wheat, barley, oats, beans, peas, tares and grasses,) bulky, dry, fibrous, innutritious aliments, (aftermath mixed with old withered stems of a former growth, hay that has ripened before being cut, dried sedges and rushes, stalks of ripened beans, peas, etc.,) and finally musty, rusty or otherwise injured hay. Salivary fistula or obstruction and worn or diseased teeth may contribute to it.

Symptoms.—Develop more slowly than in tympany. There is dulness, sluggishness, raised back, hurried breathing, and frequent moaning. The abdomen swells, especially the left side, but it hangs downward, has no absolute drum-like resonance on tapping, and pressure leaves a temporary indentation. As the disease advances there is the same difficult breathing as in tympany, frequent passage of dung and urine, stupor and finally suffocation or death from nervous shock. If due to green food, diarrhœa usually precedes death, and a spontaneous cure may be effected by this or by vomiting, but only in rare cases.

Treatment.—In the first stage give stimulants and anti-ferments, as for tympany, with active but not irritating purgatives to unload the stomach. A pound each of Epsom and Glauber salts, 2 oz. oil of turpentine, and one half drachm of nux vomica will be a suitable dose for an ox, to be followed up by stimulants, and in seven hours, if no relief, by a second dose of the same strength. If drum-like resonance at the upper part of the left side shows the pressure of free gas, draw it off by puncturing and dash cold water over the body to encourage contraction of the paunch. Give active stimulants every two or three hours.

If there is no sign of improvement but rather stupor and sinking, the only hope is in opening the stomach in the left side where it is punctured in *tympany*, enlarging the opening until the hand can be introduced, having two assistants hold the edges of the wound in the stomach against those in the skin, taking out at least two-thirds of the contents of the paunch, sewing up the wound in the stomach with the edges turned in, and that in the skin, and keeping on a little gruel and soft mash for a week. This operation can be performed standing, the right side of the animal applied against a stone wall, and the nose held by bull-dog pincers or even by the fingers. It usually succeeds if resorted to early enough.

IMPACTION OF THE THIRD STOMACH.—DRY MURRAIN.
—**GRASS STAGGERS.**—A dry, baked state of the contents of the manifolds is found in all feverish conditions, in torpid or inactive states of the paunch, with impaired or suspended rumination, in case of feeding on dry, fibrous, indigestible elements (bleached, withered hay, or that which has been over-ripened, or a mixture of fresh and dry grass in autumn,) on a sudden change to the overstimulating fresh grass of spring, on smutty maize, corn-stalks or wheat, on a deficiency of water, or a sudden change from soft to hard water, or on taking lead into the system in a metallic condition or otherwise. The most rapidly fatal cases result from green food, over-ripe but uncured grain, vetches or rye grass, and from lead poisoning.

Symptoms.—Slight cases may be marked by failure to chew the cud regularly when recovering from a fever, a poor appetite, dry muzzle, dull eyes, spiritlessness, quickened breathing, with a moan at intervals, roused at any time by forcibly punching the closed fist beneath the short ribs on the right side. If it has lasted several days the fist pressed into the left side may detect the contents of the paunch collected in hard masses, and *tympany* is likely to be present. The dung is usually scanty and hard, but in cases occurring from fibrous or irritating food, this costiveness is preceded by more or

less diarrhoea. The beast leaves its fellows, reclines on its left side, with the head in the right flank, and tends by-and-by to show palsy of the hind limbs, drowsiness and stupor, or delirium and convulsions.

In the more acute cases, death may ensue in six hours. The animal is found apart, lying with his head in his right flank, with red fixed eyes, eyelids half closed, and much drowsiness and stupor, though he may still feed when raised, pulse and breathing accelerated, bowels loose or torpid, hardness and tenderness under the right short ribs, and muscular tremors. Later the eyes glare, the patient seeks relief in motion, in a straight line or to one side, regardless of obstacles, and pushing against obstructing walls or fences till teeth or horns are broken, bellowing loudly and in a terrific manner all the time.

Treatment.—For the simpler forms give strong purgatives (sulphate of soda, ox 1 lb., sheep 6 oz., with common salt, molasses and croton,) stimulants (ginger, carbonate of ammonia,) and abundance of water or watery fluids. The stimulants may be repeated at intervals of three hours, and accompanied by injections of warm water. If no relief is obtained in twelve hours repeat the purgative, and if any tenderness of the right side exists, blister it with mustard and turpentine (for sheep use ammonia and oil). If the kidneys act profusely, change the purgative, giving castor or linseed oil. Even after free action of the bowels it is usually necessary to feed green food, roots or soft mash, to give all the water that will be taken, and even to add slight laxatives, to insure the breaking up of all the impaction.

In the acute forms of the disease with irritation of the stomach, the blandest purgatives only (linseed, olive or castor oil) must be used with nux vomica, injections and a blister on the right side over the short rib, and cold water or ice-bags to the head. Should the victims become delirious, fasten to a strong post round which they can move, or to a ring fixed in the ground. When recovery ensues, follow up with a course of bitter tonics (gentian, willow-bark, nux vomica, boneset, etc.)

GASTRITIS IN OXEN.—The acute impactions of the manifolds are usually complicated with congestion, and the chronic impactions lead to it. Inflammation also results from over-stimulating food, (spring grass, clover, tares, green corn, etc.,) from dry, heating aliment, (excess of corn meal, linseed cake, rape cake, cotton cake,) from wild mustard and other irritants, from poor, hard, fibrous food, from suspension of rumination during prolonged hard work, and from mineral and vegetable irritants.

Symptoms.—In mild cases, from heating or poor food, there are dulness, moaning, trembling, straining and frequent passage of dung in small quantities, hot, clammy, slightly reddened mouth, dry muzzle, sharp, accelerated pulse, fulness and tenderness of the belly, and the presence of solid masses of food in the paunch as felt on the left side when pressed with the fist.

The more active forms, resulting from green food or irritants, are manifested by the same symptoms as acute impaction of the third stomach, with the addition of a tense abdomen, not dependent on the paunch, increasing tenderness and increased temperature of the body. There may be diarrhoea or costiveness, or one after the other, and it may end in stupor or convulsions.

Treatment.—In the milder forms give a quart of linseed or olive oil and 2 drs. Dover's powder. Even Epsom or Glauber salts may be used with drachm doses of hyoscyamus or belladonna as often as may be requisite to keep down violent suffering. Give all the water the patient will drink, adding a little decoction of linseed, slippery elm or mallow; also give frequent injections of warm water, and warm fomentations to the abdomen, followed by a blister. Brain symptoms must be treated as advised under impaction of the third stomach. Follow up with a course of tonics after relief is obtained.

INDIGESTION IN WORKING OXEN FROM DRINKING COLD WATER.—This occurs in hard-working oxen, coming from a dusty road on a hot day and drinking to excess. There are violent colicky pains, uneasy shifting of the hind limbs, lying down and rising, looking at the

flanks, and a fulness and gurgling on the right side of the abdomen. It may pass in half an hour to an hour with a free watery diarrhoea. *Treatment* consists in exercise, walking or trotting, and a stimulating draught—pepper, ginger, fennel, caraway, peppermint, ammonia, alcohol and the like.

INDIGESTION IN CALVES, LAMBS AND FOALS.—
WHITE SCOUR.—This may result from a great variety of causes, such as withholding the first (laxative) milk after parturition, feeding new-born calves on the milk of old calved cows, bringing up foals or lambs on cow's milk, working, over-driving or otherwise exciting the dams, feeding unwholesome food to the dams, allowing too long intervals between the meals of the young, bringing up on hand on cold or soured milk or farinaceous food, keeping in damp, unwholesome pens, or the accumulation of pellets of hair in the stomach.

Symptoms.—Irregular (impaired or even ravenous) appetite, swollen, tender, drum-like abdomen, sour eructations, profuse, foetid, white, watery diarrhoea, white or grayish fur on the tongue, dry, scurfy, unthrifty skin, and rapid emaciation.

Treatment.—Give a dose of 1 to 2 ozs. castor oil ($\frac{1}{2}$ for lambs) with a teaspoonful of laudanum. Then with each meal give a tablespoonful from a bottle of sherry in which $\frac{1}{8}$ of the fresh fourth stomach of a calf has been steeped. Or with this give a carminative (1 oz. tincture of cinnamon) with an antacid (prepared chalk or magnesia 1 dr.) and soothing or anodyne agents (gum Arabic, bismuth) with, it may be, an astringent (tincture of kino or catechu 1 dr.) If there is much tenderness of the abdomen apply a pulp of mustard and water. If yellowness of the mucous membranes and white, very foetid dung, give 2 grs. calomel and 5 grs. chalk twice daily. In all cases give fresh, warm, wholesome milk thrice a day, with several spoonfuls of lime-water added to each meal. In some instances the tone of the stomach may be greatly restored by a tablespoonful of tincture of gentian twice a day.

Prevention should be sought in breeding only vigorous families, sheltering properly, and feeding the milk of the dam or of a healthy nurse, unaltered by faulty feeding or excitement or by standing. When a foal must be brought up on cow's milk, dilute with one-third its bulk of warm water, sweeten with sugar and add lime-water. For the carnivora use only the upper third of cow's milk.

ACUTE GASTRIC INDIGESTION IN THE HORSE.—
TYMPANY.—This results from sudden filling of the stomach to excess, from suspended indigestion in connection with hard work immediately after a meal, from the washing on of undigested food, from a full drink after a feed of grain, from certain indigestible and easily fermented aliments, such as cause tympany in the ox, from irritant plants, and from hurried swallowing of hot, cooked food.

Symptoms.—These appear just after feeding, and are at first those of simple colic, (see Spasmodic Colic) soon followed by fulness and tension of the belly, a drum-like sound when it is percussed, quickened, deep, oppressed breathing, dulness and increasing stupor. The pain is continuous though of varying intensity, there is no disposition to eat or drink, draughts administered tend to aggravate the symptoms, the sufferer yawns, places his fore feet apart, arches the neck, drawing in the nose towards the breast, and in exceptional cases, may obtain relief by belching gas, or even by vomiting, the food escaping mainly through the nose. More commonly the occurrence of vomiting implies rupture of the stomach and presages death. The pulse then becomes rapid, weak and soon imperceptible, and the countenance very haggard and dejected. In the advanced stages the animal is usually sunk in stupor, and rests his head on the manger or pushes it against the wall, while in some instances nervous movements of the lips and limbs occur.

Treatment.—Give early, full doses of aromatics, stimulants and tonics, (tincture of pimento or ginger, oil of peppermint, aqua ammonia, ether, alcohol, peppers, nux

vomica, etc.,) rub the belly, and if relieved, follow up with a dose of physic. Alkalies are sometimes useful, as in the ox. Warm water injections and walking exercise should also be given. The stomach of the horse cannot be safely punctured, hence the affection is too often fatal. When relieved, give easily digested food frequently, in small quantity, until the stomach has regained its tone. When horses bolt their food give a little hay to appease hunger before allowing grain.

ACUTE INTESTINAL INDIGESTION IN THE HORSE.—
TYMPANITIC COLIC.—Due to the same causes as *gastric tympany*, this often complicates that, and is complicated by it, the disease being named according to the predominance of the gaseous evolution in stomach or bowels. When the bowels are mainly implicated, there is greater hope, as medicines may be passed through the stomach and taken up from the gut so as to affect the system, and the gas may even be drawn off with a small cannula and trocar from the large intestines which occupy the lower part of the abdomen. The puncture should be made where the resonance is clearest and most drum-like. The symptoms closely resemble those of tympanitic stomach, only there is more passage of dung and flatus, and the treatment only differs in the greater freedom with which liquids may be poured into the stomach and the possibility of drawing off the gas through a cannula.

IMPACTION OF THE LARGE INTESTINES IN HORSES.
 —This results from overfeeding, especially on grain, (Indian corn, wheat,) from hard, fibrous, indigestible food taken in excess to make up for the deficiency of quality; from imperfect preparation of the food in diseases of the teeth, jaws or salivary glands; from insufficiency of water, and eminently from want of exercise.
Symptoms.—Considerable impaction may last for a time without any sign, and the disease finally shows itself suddenly as a violent colic. More commonly transient colics come on after meals for several days in succession. There are pawing with the fore feet, uneasy movements, or kicking of the belly with the hind, lying

down and rising at short intervals, turning of the nose toward the flank, and the frequent passage of wind and of dung, the latter a few small pellets at a time. There is special fulness and tension of the right side of the belly, dullness on percussion, solid resistance when pressed, and if the soaped hand is introduced through the last gut the solidly impacted bowels are usually to be felt. The pressure of these on the bladder often causes frequent discharges of urine. A favorite position is one with the fore limbs stretched forward and the hind backward.

Treatment.—In mild cases and in the early stages give a laxative diet (roots, soft bran mashes, oil meal, corn-stalks,) and two or three ounces of Glauber salts daily in the food. In the more severe, give aloes, gentian and nux vomica, and in case of tympany, carbonate of ammonia or peppermint; relieve pain by hyoscyamus or belladonna, and follow up with frequent injections of warm water, and frictions and fomentations of the abdomen. The aloes should not be repeated under twenty-four hours, but if there is evidence of their having passed off by the kidneys they may be replaced by linseed or olive-oil. The action of the bowels may be deferred three or four days without a fatal result, whereas too much medicine will often cause rupture of the gut in front of the impaction.

Prevention should be sought by a more laxative diet, by a liberal supply of water, by exercise, or even by daily doses of one or two ounces of sulphate of soda in the food. The addition of two drachms of powdered gentian and ten grains of nux vomica will often restore lost tone to the bowels.

CATARRH OF THE STOMACH AND BOWELS IN HORSES.
—This is a form of chronic indigestion resulting from faults in diet, as regards quality, quantity and regularity; from a habit of bolting food; from starvation and hard work; from a sudden access of rich food; from the irritation of worms; from congested or torpid liver; from impaction of the bowels or from any irritant in the food.

Symptoms.—Unthrifty appearance, rough coat, hide-bound, irregular or capricious appetite, dullness at work, emaciation, tucked up belly, clammy, furred tongue, irregularity of the bowels, diarrhoea alternating with constipation, hard balls of imperfectly digested dung covered with a film of mucus, foetid sour odor of stools, and an inclination to lick the white walls or fresh earth.

Treatment.—A carefully regulated and easily digested diet, (green food, sound hay, ground oats, roots,) moderate regular exercise, a clean, warm, comfortable stable, rock salt to lick at will, and a course of tonics, (gentian with nux vomica, white bismuth, and sulphate of soda,) morning and evening. Change from one tonic to another as they seem to lose their effect. Slippery elm, boiled linseed, mallow, etc., are often used in checking irritation.

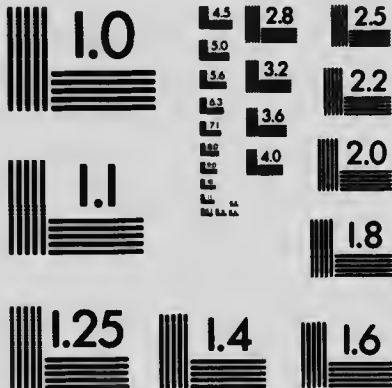
VOMITING.—This is common in carnivora and pigs but exceedingly rare in cattle, and still more so in horses, asses and mules. It may be due to a great variety of causes, as direct irritation of the stomach by food, poison, congestion or inflammation, disease of the brain, or of some other organ, which profoundly affects the system, or which, like the throat or gullet, has intimate nervous relation with the stomach. It is therefore mostly a symptom of other diseases, and in many places of gastric irritation is a means of relief. When due to direct irritation of the stomach favor it by giving tepid water freely. When emptied, the stomach may be soothed by ice, iced water, prussic acid, creosote, carbolic acid, bismuth, nux vomica, lemon-juice, camphor etc. Gum and albumen may often be given to sheath the irritated organ, and a blister may be placed on the pit of the stomach.

DEPRAVED APPETITE.—Seen in dyspeptic horses, eating earth, lime, etc., in rabid dogs swallowing all sorts of things, and in cows eating chalk, earth, sand, gravel, wood, leather, iron bolts, and articles of clothing, hair, bones, lead, etc. In many cases what is begun as a habit is continued as a disease, the foreign bodies in the stomach deranging the digestion and keeping up a mor-



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bid craving. Pregnancy, tuberculosis, and a deficiency of phosphates in the soil and food are occasional causes in cows. The habit should be checked by keeping tempting objects out of reach, dealing with tuberculosis and chronic gastric catarrh as advised under those heads, with a deficiency of phosphates, by an abundant artificial feeding on sound grains and a course of tonics, and with indigestible bodies in the stomach, by a careful feeding to prepare the beast for slaughter, or that failing by opening the paunch on the left side and removing the offending agent (see *impacted paunch*).

FOREIGN BODIES IN STOMACH AND INTESTINES.—

These may be taken in by accident with the food or may be deposited from it in the form of calculi or concretions.

Cattle suffer much from sharp-pointed bodies like needles, pins, nails, etc., taken with the food, and afterward making their way to the heart which they penetrate, causing sudden death, or in more favorable cases making their way through the walls of the abdomen and escaping. Blunt objects remain in the paunch and honeycomb-bag, causing much or little irritation according to size or number. The most varied objects are often found in the cattle slaughtered for beef and in good health, nails, coin, shot, solder, buttons, and hair-balls, are among the most common. I have known fifteen hair-balls from three to six inches in diameter in the paunch of a healthy fat heifer. In sucking calves, in which they form in the true stomach, they cause dyspepsia, diarrhoea, and emaciation.

Sheep suffer from wool-balls, from the fine hairs of clover and other ailments, and from collections of sand and gravel when fed turnips from damp soil.

Swine have balls of bristles in the stomach and large intestines.

Horses have concretions of phosphate of lime, with smooth stony surface; of ammonia-magnesian phosphate with rough crystalline structure; of the fine hairs from the surface of the oat with a fine velvety surface; and of two or more of those mixed in one calculus. These are formed equally in the stomach and large intestines.

Dogs have hair-balls mainly in the large intestines, as well as marbles and other objects picked up in play.

These foreign bodies may exist without any manifest result, or they may cause tympany in cattle and sheep after every meal, vomiting in dogs and pigs, acute indigestion in the horse, and in all animals in which they are lodged in the intestines, obstruction of their passage, and violent colics which recur frequently, and usually cut the animal off sooner or later.

In *ruminants* the offending bodies may be removed from the stomach by surgical operation, but in others little can be done beyond giving anodynes (opium, belladonna, stramonium, etc.) to relieve pain and spasm and await the result. A dose of physic would carry off the smaller calculi but would be dangerous in the large. But these cases can rarely be recognized until after death, and are necessarily classed with a number of others, (invagination, constriction, etc., of the bowels,) in which there is irremediable obstruction, and which end sooner or later in death.

SPASMODIC COLIC.—BELLY-ACHE.—This term is loosely used to designate all conditions in which there is pain in the belly, whether from disease of liver, pancreas, urinary organs, generative apparatus, stomach or bowels, and whether caused by nervous irritation, inflammation, improper position, strangulation or compression by adjacent organs, obstruction by foreign bodies, etc., etc. The present remarks will be confined to that which is more purely nervous and which results from spasmodic contraction (cramps) of the bowels.

In certain susceptible states of the system a slight indigestion, without impaction or tympany, the taking of indigestible matters that would have been harmless at another time, a drink of ice-cold water when perspiring and exhausted, a chill rain or dew will cause spasms and the most excruciating agony.

Symptoms.—The attack is sudden, the horse paws, moves uneasily, kicks at the belly, looks at the flanks with anxious countenance, dilated nostrils and glaring

eye, crouches with semi-bent limbs for a few seconds, and then throws himself down with a prolonged groan. He rolls, lies on his back, sits on his haunches, and may get up, shake himself, take to feeding and appear quite well. Another fit comes on in ten, fifteen, twenty or thirty minutes, and after each there is a period of freedom from pain, with natural pulse and breathing. This with the reckless manner in which he lies down, and the entire absence of tenderness of the abdomen, or of elevated temperature, serve to distinguish from other bowel diseases, especially inflammation. Each succeeding attack may be less severe until they cease, or they may increase in severity and the disease emerge into acute tympanitic indigestion or enteritis.

In *cattle* there are similar symptoms, with uneasy shifting of the hind limbs, kicking with the upper one when down, twisting of the tail and moaning. It rarely lasts more than an hour or two.

Dogs curl themselves up to rest, but move uneasily or moan, and with the more violent pains start up with a sudden yelp, move round for some time, and lie down until the next spasm comes on. The eye is bright, the nose cool and moist, the pulse natural, and the appetite retained.

Treatment.—In all animals alike, a laxative (aloes, horse; linseed-oil, cattle and sheep; castor-oil, pigs and dogs;) is the safest treatment, as it soon relieves the spasm and carries off any irritant that may have contributed to maintain it. It is usually desirable to add an anodyne (belladonna, hyoscyamus, opium, aconite, chloral-hydrate,) to relieve the pain until the laxative is absorbed, and a stimulant anti-spasmodic (carbonate of ammonia, sweet spirits of nitre, ether,) to quiet the nervous excitement. Copious injections of warm water with or without anodynes and anti-spasmodics are not to be neglected, neither is quiet walking exercise. If the affection appears purely spasmodic, the laxative may be withheld until two doses of anodynes and anti-spasmodics have been given at intervals of half an hour, but should these fail, give the opening medicine at once, and then

only enough of other agents to moderate excessive pain until it has had time to be absorbed. Complete relief may be looked for in three or four hours.

ACUTE HEMORRHAGIC ENTERITIS.—This is very common in hard-working horses in some localities, and is also seen in cattle, sheep, swine, and dogs. It may follow unrelieved obstruction of the bowels, especially if these have been treated by powerful opiates and stimulants or dangerously irritant purgatives. To these must be added excessive fatigue, heavy, hurried feeding, and drinking iced water, exposure to a cold draught, chill rain, or cold sponge when exhausted, a sudden change to dry grain feeding, to new oats or hay, to rank, rapidly-grown clover or grasses, or to musty food.

Symptoms.—When not supervening on indigestion or obstruction of the bowels its onset is sudden. The patient stamps, paws, looks at his flank, moves from place to place, walks crouching'y, lies down, rolls, acts in short as in spasmodic colic, but there is a more careful lying down, there is no intermission to the pain, the face continues pinched and anxious, even if the beast stands quiet for a few seconds, the eye remains fixed and glazed, the pupils dilated, the breathing hurried and catching, the pulse rapid and becoming smaller and weaker, the temperature unnaturally high, the surface covered with sweat and often cold, and the limbs and ears deathly cold. The abdomen is usually tender. As the disease advances the animal may become still, but all the other signs are worse. Others become reckless and dash about, peeling and injuring themselves and imperiling those about them. The bowels are confined, and in the advanced stages the pellets passed may be stained with blood. Death may ensue in from three to twenty-four hours after the onset.

Treatment.—If seen at the outset, give a mild laxative (olive-oil) with an anodyne (hyoscyamus). Bleeding from the jugular vein may give prompt relief if the pulse is still full and strong. But neither of these can be ventured upon except at the very outset, and therefore in the great majority of cases are to be avoided. Apply hot fomenta

tions to the belly by a blanket wrung out of water nearly boiling, rub the limbs with ammonia, mustard or turpentine, and give injections of warm water containing 2 10-dynes (belladonna, hyoscyamus, opium, aconite, tobacco, etc.)

If the soft, weak, rapid pulse bespeaks already existing effusion, avoid bleeding and laxatives, give one or two drachms of opium by mouth, or better one or two grains sulphate of morphia injected under the skin, repeating as often as may be requisite to moderate suffering and keep the bowels inactive, accompanying this by hot fomentations and counter irritants.

In case of improvement feed linseed or oatmeal meals, boiled linseed, or very sloppy bran mashes only, and in small amount, for several days. If the bowels continue confined, give four or five ozs. olive-oil or three or four ozs. Glauber salts once or twice a day.

But *prevention* is especially to be sought in such a rapidly fatal disease. Regularity and sufficient frequency of feeding, in moderate quantities at a time and of good quality, and a gradual instead of a sudden change of diet, are important. When new hay or grain, or heating agents like maize or wheat are fed, one feed daily should be replaced by a sloppy bran mash, or one or two ounces of common or Glauber salts added. Avoid full draughts of cold or iced water when sweating and exhausted, and of any water after a meal of grain.

ACUTE MUCO-ENTERITIS.—All the domestic animals are subject to this form of inflammation, chiefly of the mucous membrane of the bowels. The causes are mainly the same as those of hæmorrhagic enteritis acting on a less susceptible subject, or with lessened force. These may be named exposure, sudden extreme changes of weather, coarse, dry, fibrous, musty, or otherwise irritant indigestible food, abrupt changes of diet, impure, stagnant or putrid water, too much water after feeding, or iced water when fatigued and perspiring, drastic or oft-repeated purgatives, suppressed perspiration, sand in the food, parasites, and the various mechanical obstructions

(calculi, impactions, invaginations, hernia). Cattle, sheep and swine especially suffer during the vicissitudes and extremes of spring, summer and autumn, and the latter from want of water to drink and wallow in. Among dogs the young suffer most and those kept on animal food, or that bathe in rivers when heated in the chase. Chickens contract it from faults in feeding and watering, but especially from exclusive feeding on grain and deficiency or impurity of the water.

Symptoms.—In the mildest forms are fever, increased temperature, thirst, scanty, high-colored urine, costive bowels, the small masses of dung covered with a film of mucus, tender belly, small, quick, hard pulse, yellowish-red eyes, hot clammy mouth, furred tongue with redness along the edges, tip and lower surface, impaired appetite, dull sluggish habit, loss of flesh, unthrifty skin, and slight colics after meals.

In the more severe forms all these symptoms are increased in severity, appetite gone, dulness and depression extreme, head carried low, gait unsteady, breathing excited, a ridge on the tender abdomen as in pleurisy, and more frequent colic, with pawing, uneasy shifting of the limbs, kicking at the abdomen, looking at the flanks and lying down and rising. Diarrhoea may set in and herald recovery, or it may become profuse, bloody and fatal.

In addition to these general symptoms, *cattle* and *sheep*, have impairment or loss of rumination, frequent belching of gas, foetid breath, and tenderness mainly of the right side of the abdomen. When due to acrid and irritant plants, the back is arched, abdomen tense and tucked up, constipation obstinate, tongue often purple and the urine high-colored or even bloody. It may prove fatal after a fortnight's sickness. In *swine* the affection is usually mistaken for *Intestinal Fever*, which indeed it strongly resembles, but without the ineffaceable black spots on the skin and mucous membranes, and without a contagious principle. In *dogs* much dulness, drowsiness, restlessness, with tucked up, tense, very tender abdomen, violent constipation, and very painful and difficult passage of dung are added to the general symptoms. Vomiting is

common in dogs and pigs. *Chickens* lose appetite and vivacity, droop the head, raise the feathers, move sluggishly, scour, strain violently, and show much tenderness of the abdomen when handled.

Treatment.—At the outset give a laxative (horses, aloes; ox or sheep, Glauber salts; or for all animals, olive oil; with anodynes (belladonna, hyoscyamus, Indian hemp,) in a mucilage of slippery elm or gum Arabic, and repeat these mucilages and anodynes as may be needful to quiet the suffering. Mild cases may be successfully treated by small daily doses of sulphate of soda with abundance of mucilage, and tonic doses of gentian and nux vomica. Give injections of hot water, with anodynes, and apply fomentations, or in small animals poultices, followed by mustard or other counter-irritants to the belly, as in hæmorrhagic enteritis. When profuse diarrhoea sets in give freely of mucilaginous and starch drinks, with quinia, gentian, nux vomica, or other bitter and opium. The diet must be restricted to well-boiled, mucilaginous gruels, and in the case of herbivora, sloppy, warm bran mash.

The treatment of diseased chickens is always very satisfactory, but the whole flock must have mush, vegetables, and boiled potatoes, with clean, pure drinking water, to which may be added cream of tartar or Glauber salts, 1 oz. to every quart.

CROUPOUS ENTERITIS.—This occurs in cattle, horses, sheep and dogs, and may be considered as a modification of the other forms of enteritis and produced by similar causes. The symptoms may approach those of either of the two forms of the disease already described, the suffering being extreme and lasting, or violent but short, and followed by dulness, depression, fever, and tenderness of the belly. If the animal survives long enough the false membranes are passed in great white, friable masses or shreds. In its earliest stages a laxative will often alter the condition of the membrane and contribute to a prompt recovery. Later treat as in enteritis. Saline laxatives (sulphate of soda or magnesia) and bitters (nux

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vomica, gentian, quassia, quinia,) are especially indicated when the membranes are separating. If resulting from mercurial poisoning, give chlorate of potassa and iodide of potassium.

INFLAMMATION OF THE RECTUM.—The last or straight gut often suffers exclusively in horses and dogs in connection with the impaction of hardened dung, or calculi, and in oxen with a certain conformation from the introduction of air. Dung is passed in long cylindroid masses, with great straining and pain, or cannot be passed at all. In the dog it is covered with mucus, pus or even blood. The everted gut is of a deep red color, thick, infiltrated and hot. Rupture may ensue if it is not relieved. *Treat* by emptying the gut with the oiled hand or finger, give a spare laxative diet (bran mash, roots, gruels,) frequent injections of warm water containing some mucilage and olive oil, and an occasional purgative (olive or linseed oil).

In high-rumped oxen, cut the muscles on the upper surface of the tail, and tie it down until healed.

DIARRHŒA.—SCOURING.—This is a frequent discharge of semi-liquid or liquid dung from the bowels without griping or violent straining. It is a symptom of disease rather than an independent malady, as it may arise from almost any irritant in the bowels. Among its common causes may be named a full drink, followed by active exertion; feeding soft, aqueous, rapidly-grown green food; cooked food for hard-working horses; many irritant and acrid plants; spoiled potatoes, turnips, apples, etc.; stagnant, putrid water; undigested matter in the bowels from imperfect mastication or digestion; impaction of some part of the bowels; worms, etc. It may occur from irritants secreted from the blood, as in the case of purgative agents accidentally taken in with food or water, and the morbid elements of certain fevers (Rinderpest, Texan fever, hog cholera, lung fever.) Lastly, a reflex irritation from the skin, as in exposure to chilling rains, night dews, or to damp stalls, or to hot.

damp buildings, seasons or localities. Horses are especially liable to superpurgation if worked or supplied with ice-cold water during the operation of a dose of physic.

Symptoms.—These may be slight as in the frequent pulpy evacuations of animals fed exclusively on roots; or severe, as in the excessive and almost constant discharge of a dark colored liquid mixed with mucus. Slight diarrhoea does not affect the appetite nor interfere with improvement in condition, but in the severer forms there is loud rumbling in the abdomen, loss of appetite and condition, rapid, small, weak pulse, hurried breathing, pallid mucous membranes, and weakness even to unsteady gait. Distension of the belly, with pawing and other signs of abdominal pains may appear in bad cases. In horses it is often followed by inflammation of the feet.

Treatment.—Unload the bowels by linseed, olive or castor oil, according to the patient, adding laudanum, and follow up by mucilaginous (linseed, gum Arabic, slippery elm) or starchy draughts, or even injections, with or without laudanum, as may seem required. In prolonged and obstinate cases, astringents (kino, catechu, oak bark, tannic acid, nitrate of silver,) with tonics (gentian, cinchona, salicine, nux vomica,) and carminatives (camphorated spirit, ginger, peppers, caraway, fennel, etc.) may have to be employed. But in no case should astringents or opiates be used until the irritant has been carried off by a laxative, and usually a change of diet is needful to prevent a second attack. In acute or obstinate cases, dry rubbing or blister to the belly may be useful, and perfect rest must be enjoined.

DYSENTERY.—BLOODY-FLUX.—This is a morbid process approaching inflammation of the mucus membranes of the large intestines, and leading to the formation of ulcers. It occurs in cattle, horses, swine and dogs, and may be enzootic on certain rich impervious soils, or even epizootic.

Causes.—Those of diarrhoea acting with greater energy; the emanations from marshy, inundated soils,

or from carcases; putrid, stagnant or iced water; musty, putrid, or otherwise altered food; over-exertion in excessive heats; or even a *contagium*.

Symptoms.—The acute form comes on suddenly with symptoms of *acute intestinal catarrh*. The dung is passed frequently with straining, and is semi-liquid and foetid. Later it is quite liquid, with mucus, blood, and shreds of false membranes or sloughs, intolerably offensive, and passed with still more pain and straining. Later still, the same painful straining fails to bring away anything, though the red, infiltrated and excoriated rectum may protrude. At length the discharge again reappears more repulsive than ever, and passes involuntarily. Appetite is gradually lost but thirst increases. Fever exists at first, with staring coat and even shivering, hot, fevered mouth and accelerated pulse, but this is less marked as the disease becomes chronic. Then there is extreme emaciation, cold limbs, dry, cracked muzzle, hide-bound, scurfy, unhealthy, lousy skin, often covered with flies, deeply-sunken, pallid eyes, and involuntary liquid putrid discharges. Death may occur in three or four days or the disease may be protracted for months.

Treatment.—Rub the belly actively and apply mustard, or in small animals give a warm bath. Give a mild laxative (olive-oil, Glauber salts,) with calmative (Dovers' powder, laudanum). After the laxative has acted give daily Dover's powder with ipecacuanha, sal ammoniac, or should these fail to improve the discharge, astringents (kino, catechu, gall-nuts, oak bark, black currant bark, walnut leaves, tormentilla, rhatany, etc.,) with tonics (quinia, nux vomica, salacine, cascarilla, carbonate or sulphate of iron, sulphate of copper, nitrate of silver). Small doses of oil of turpentine, copavia, creosote or carbolic acid often act beneficially on the diseased mucous membrane. The same agents may be given as injections in mucilaginous fluids. Diets must be bland, easily digested, and fed little at a time. Mashies of wheat bran, or flour from the whole grain of wheat, barley or oats, and fresh pulped or cooked roots may be given to the herbivora; and farinas made into puddings

with just enough juice of meat to insure their being eaten, to the carnivora. Fresh raw meat without fat, beaten to a pulp in a mortar will often agree when nothing else will. The drink should be mixed with a little boiled linseed, gum, slippery elm or barley water.

OBSTRUCTION OF THE BOWELS.—Under this head may be considered all cases of complete obstruction of the bowels excepting those of the nature of hernia or rupture. It will include blocking of the gut by hardened dung, calculi, and foreign bodies swallowed; invagination or the slipping of a portion of gut into what is adjacent, like the drawing of a finger of a glove into itself; volvulus, or the rolling on itself of a portion of intestine with its connecting membrane until nothing can pass through it; strangulation of an intestine by another rolled round it, by a tumor hanging by a long pedicle, or by a band of false membrane formed in some pre-existing inflammation and gradually contracting; tumors formed within a gut; and in steers the strangulation of a loop of intestine in a pouch in the right flank formed by contraction on the spermatic cord in castration.

The *symptoms* of complete obstruction are those of severe *spasmodic colic*, but without the intervals of complete freedom from pain. It differs also from enteritis in that there is no rise of temperature at first. The dung may be abundant at the outset, but as the disease advances is more or less completely suppressed, the portion of intestine behind the obstruction having been emptied. The *horse* often seems to obtain a partial temporary relief by sitting on his haunches or lying on his back, and will retch, though vomiting is rare, unless the stomach is ruptured. If the obstruction is in the pelvic flexure of the large bowels it may be felt by the hand introduced through the rectum.

In *ruminants* the *colic* is usually followed by quietude, but there remain extreme lassitude, depression, sunken eye and dry hot muzzle, and even stupor or coma. In cattle the hand introduced into the rectum will detect the mass of the overdistended bowel above

the obstruction. It may also ascertain the existence of a pouch imprisoning the gut in the right flank and may even pull it out and relieve.

In *dogs* violent colic may be absent, but there is much depression, inappetence, vomiting of the bile or fæces, arching of the back, tucking up of the belly, the passage with much pain and straining of mucus-covered fæces, and later, straining without any passage, while the overloaded gut may easily be felt through the walls of the belly.

Treatment.—In most cases of absolute obstruction nothing can be done except to relieve the pain by anodynes (opium, belladonna, stramonium, Indian hemp, etc.,) and leave to nature. *Invagination, volvulus* or *gut-tie*, when their presence is ascertained in ruminants, pigs or dogs, would warrant an incision through the walls of the abdomen and an attempt to rectify with the hand. In cattle the opening must always be made in the right flank, the left being occupied by the paunch. The wound must be afterward carefully sewed up and the animal prevented from rubbing it. *Gut-tie* may often be remedied by manipulation with the hand in the rectum, or even by the simpler expedient of jumping from a bank about two feet high, though, if due to adhesion of the cord to an intestine the abdomen must be opened and the band cut.

HERNIA—RUPTURE—BURST.—Hernia is understood to mean the displacement of some internal organ through a natural or unnatural opening. Of abdominal organs the bowels and omentum are those that most commonly protrude, though the womb often escapes in bitches. According to the structure through which the organ passes the hernia is named:—into the chest, *diaphragmatic* or *phrenic*; through the omentum or mesentery, *omental*, *mesenteric*; through the naval, *umbilical*; into the scrotum, *inguinal* or *scrotal*; through the femoral arch to the inner side of the thigh, *femoral*; through an artificial opening in the walls of the abdomen, *ventral*; through the relaxed walls of the vagina, *vaginal*.

Diaphragmatic Hernia may occur from violent muscu-

lar efforts, from the violent shock of a heavy abdominal organ on the midriff in leaping or from laceration with a broken rib or other offending body. The worst cases are suddenly fatal from suffocation. In others there is a sudden access of difficult breathing with gurgling sounds on auscultating the chest. In still others, with a smaller rupture, the rumbling in the chest may be absent but there is violent, continuous colic and rapid prostration as in *obstruction*. In the slightest forms there is only an extra lifting of the flanks as in *heaves*. *Treatment* is useless, though rest and anodynes will allow a slight case to merge into the chronic form.

Mesenteric and Omental Hernia give rise to complete obstruction of the bowels and can rarely be recognized nor remedied.

Umbilical Hernia is common in horses, dogs and very young ruminants. It is usually congenital but may result from violent straining, running or jumping. The swelling is very manifest and when handled its contents are found to move on each other, to gurgle and to pass back in a mass when pressed.

Treatment is often needless, the sac becoming effaced with growth. If not, make a soft pad for the navel and attach it to elastic bands passing round the body and fixed in their turn to others extending back from a collar round the neck. Or in slight cases blister the sac severely and repeatedly; or apply wooden clamps over the skin close up to the belly, having first perfectly returned the protrusion, and let them be worn until they drop off.

Inguinal Hernia occurs in the male quadruped of any age, as the sac containing the testicle remains continuous with the abdomen throughout life. It is rare but by no means unknown in the castrated animal. It may exist without any other *symptom* than an unnatural swelling of the scrotum, the contents movable on themselves, the thickening extending up to the abdomen, and the whole disappearing suddenly and in a mass when pressed. Or these signs may be associated with the violent and continuous colicky pains of obstruction. In all cases of colic

in entire males the possibility of hernia should be borne in mind and an examination made.

Treatment is very varied, in difficult cases requiring anatomical knowledge and attention to many minutiae which cannot be given here. Yet in many cases the hernia may be returned by simple pressure with the hand, with or without the other hand inserted into the last gut and carried down to the internal inguinal ring. If the patient is thrown on his back with his hind parts well raised the return will be greatly facilitated. In pigs and dogs castration should be resorted to, the gut being first returned and held back by pressing upon the canal in front of the testicle, and finally the wound in the skin sewed up. For particulars of treatment of the various forms of inguinal hernia see the author's larger work.

Femoral Hernia in bitches rarely demands or receives treatment.

Ventral Hernia is easily distinguished from other swelling of the abdominal walls by the movable gurgling contents entirely returnable into the abdomen by pressure. Though often masked by surrounding inflammation these characters can usually be recognized. *Treatment* is most successful just after the injury is sustained, as after the margins of the wound have become insensible they will not contract and heal. Return the protrusion, throwing the animal on its back and quieting with opium, ether, or chloral if necessary. Then cover the opening with pads and cover with a strong sheet wound round the abdomen and laced tightly along the back. Keep the sheet in position by bands carried from its anterior border to a collar round the neck. Adjust and pad it carefully day by day until all swelling and tenderness subside.

Vaginal Hernia must be treated like *eversion of the Vagina*.

EVERSION OF THE RECTUM.—The rectum protrudes naturally in passing dung but returns immediately. If it remains and swells it demands interference. Poorly kept animals (dogs, pigs) are liable, and it may be caused in all

from violent straining in work, parturition, constipation, diarrhoea or dysentery. The protrusion may be confined to a mucous fold at one side of the anus or the entire gut may protrude to the length of several feet. If recent it is little altered, but if old, is red, thick, softened or even ulcerated. The protrusion must be emptied, cleaned and returned, the oiled finger or arm (according to size) being introduced into the gut and through the constriction of the anus and the other hand used to strip it off from this. The head of the patient should be turned downhill and straining prevented by pinching the back. In small animals with old protrusions the part may have to be cut off close to the anus and a few stitches passed through the edges to keep them in apposition. When returned a truss should be applied as for *everted uterus* or *vagina* and a spare, laxative diet allowed, nourishing or not according to the needs of the patient.

PILES.—These are dilatation of the veins on the inner and outer sides of the anus, with exudation and fibrous thickening of the surrounding connective tissue to form rounded swelling. They are reported in all domestic animals but are especially common in dogs. Melanotic tumors in horses are often confounded with them. They are generally connected with torpid, inactive liver and an aggravated costiveness, straining and the presence of irritants in the large intestines. Dogs draw the anus along the ground as in intestinal worms, pass hardened, blood-streaked dung, with much straining, pain and sharp cries, and present around the anus bluish tumors which bleed freely if wounded and are connected with the terminal end of the gut that hangs out through the opening. The general health rarely suffers much. In other animals there is itching, switching and rubbing of the tail with the characteristic tumors and much straining and difficulty in passing dung. *Treat* by mild laxatives (sulphate of soda and common salt, 3 ozs. daily for the large, and 20 to 30 grains for the small quadrupeds; or podophyllin in one-fifth the usual doses, daily). *Give* moderately of laxative, easily-digested food and main-

tain tone by bitters (*nux vomica*). Locally bathe with tepid solutions of opium, stramonium and astringents (sugar of lead, alum, tannin, sulphurous acid, benzoated oxide of zinc ointment). Check bleeding by solutions of sulphate of iron or matico. It is sometimes necessary to remove with the ligature.

FISTULA IN ANUS.—This is a communication between a suppurating sore and the terminal part of the rectum. There are usually two openings, one in the gut and the other close beside the anus. The rational treatment is to remove any foreign body or other cause of irritation and then passing an india rubber cord through the canal, to bring the end from the internal wound out through the anus and, stretching the rubber, to tie both together, after which, by its elasticity, it slowly cuts its way through, while the wound steadily heals behind.

IMPERFORATE ANUS.—This is not uncommon in young animals and may be relieved by a free incision as soon as the accumulation of dung in the end of the rectum furnishes a firm pad on which to cut. The incision must be made in the center of the firm muscular ring that should have encircled the opening, and which may be easily felt. In mares spontaneous relief is often obtained by a rupture into the vagina. If the gut as well as the opening is wanting, there is no remedy.

PERITONITIS—INFLAMMATION OF THE LINING MEMBRANE OF THE ABDOMEN.—This occurs in all domestic animals and may be limited to a particular part or may be general. It is mostly caused by mechanical injuries, as wounds of the abdominal walls—surgical or otherwise, or by rupture of an abscess, of the stomach, intestine, bladder or womb. It may also result from sudden changes of weather, chills from exposure to excessive cold, to frigid showers or dews or to a wet bed after perspiration and fatigue. This is of course most frequent in horses and oxen. Similar exposure to cold is a common cause of peritonitis after wounds of the abdomen, as in castration.

Symptoms.—If very circumscribed there may be simply slight colic, worse at one time than another, with acute pain when the affected part is pressed. When more general there is shivering followed by a hot stage, colic, stiffness of the hind limbs, especially in the smaller animals, swelling, tension and great tenderness of the abdomen, constipation, or in rare cases, watery or even bloody diarrhoea, complete loss of appetite, vomiting in animals capable of this act, quick, catching breathing and rapid hard pulse, becoming softer, weaker and smaller when serous effusion takes place. Effusion is further attended by a relief from the colics and tenderness, a more sunken eye, pallid mucous membranes, deeper breathing, and a more pendent belly with a sense of fluctuation when it is handled. In ruminants the right side is especially tender and the animal stands crouching with its four feet near together. The wound of the abdomen usually completes the list of symptoms.

Treatment.—The abdomen may sometimes be cupped or leeches with advantage, though warm fomentations or poultices, (or even warm baths for small animals) followed by mustard poultices, are more generally applicable. Then the preparations of opium may be given in full and frequent doses to allay pain and keep the bowels inactive. Well-boiled gruels may be given frequently as injections, as what is thrown on the stomach is usually vomited or lies unabsorbed. During recovery great care must be exercised in feeding. Decoctions of linseed or well-boiled gruels of oat, barley or rye-meal should gradually give place to soft, warm bran mashes and finally to hay and ordinary food. The carnivora may have beef tea. Anodynes (opium, prussic acid,) may be given to relieve pain and diuretics (nitre, digitalis, sweet spirits of nitre, etc.,) employed to remove the effusion. Tonics (oxide of iron, gentian, cinchona, etc.,) may be demanded and occasionally mustard poultices to remove tenderness.

ASCITES—DROPSY OF THE ABDOMEN.—This may be a result of peritonitis, of obstruction to the flow of blood through the intestinal (portal) veins as in diseased liver,

spleen, pancreas, mesenteric glands, valves of the heart, etc., or finally it may depend on an unduly watery state of the blood as in certain parasitic and other disorders.

Symptoms.—Distended (pot) belly, loose and pendulous, with hollow flanks, or if the liquid is more abundant, rounded and tense. Fluctuation is easily felt if pressure is made at two different points, and percussion elicits a dull dead sound in place of the normal drum-like resonance of the bowels. The urine is scanty, appetite and digestion impaired, breathing deep and excited, condition poor and getting worse, hair dry, rough, erect and often shedding, and swellings appear along the lower part of the body into the limbs and chest.

Treatment.—Find out and remove if possible the true primary cause. When that has ceased to act employ purgatives, but especially diuretics (digitalis, oil of turpentine, iodide of potassium, squills, colchicum, nitre, etc.,) in as full doses as the strength will permit, with tonics (sulphate of iron, gentian, nux vomica), and apply tincture of iodine over the abdomen. The liquid may be drawn off with a fine cannula and trocar, one-half only being extracted at a time, and the flaccid walls at once supported by a tight bandage encircling the body.

GASTRIC AND INTESTINAL PARASITES.—LARVA OF INSECTS.—*Bots.*—These are the larva of four different species of *gadji* that pester horses in summer and autumn, gluing their little white ovoid eggs on the long hairs beneath the jaws, on the breast, shoulders and fore limbs on which the empty shells may be carried through the winter. When the horse licks himself the live embryo is extracted from the egg and swallowed, or in the case of those beneath the jaws they fall into the food and are devoured with it. By the aid of the hooks around their heads they attach themselves to the mucous membrane mainly of the left half of the stomach but often also of other parts such as the right side of the stomach, the duodenum or small gut leading from the stomach, and the throat. There they steadily grow in the winter and in spring pass out with the dung, burrow

in the soil, and are transformed into the gadfly. The disturbance they cause depends on their numbers and the portions of the canal on which they attach themselves. In the throat they produce a chronic sore-throat and discharge from the nose, which continues until the following spring, unless they are previously extracted with the hand. In the left half of the stomach, which is covered with a thick insensible cuticle, they do little harm when in small numbers, hence Bracy Clark supposed them to be rather beneficial in stimulating the secretion of gastric juice. When very numerous, and, above all, when attached to the highly sensitive right half of the stomach or the duodenum, they seriously interfere with digestion, causing the animals to thrive badly, to be weak or easily sweated and fatigued, and even determining sudden and fatal indigestions. This last result is especially liable to occur in spring or early summer, when the bots are passing out in great numbers and hooking themselves at intervals to the coats of the sensitive bowels in their course. They will sometimes accumulate in such numbers as to actually block the passage. They even attach themselves to the skin outside the anus, causing the animal to go awkwardly, to switch his tail, and to give other signs of extreme discomfort until the tail is raised and the offender discovered and removed. Alleged perforations of the stomach by bots are usually ruptures, the result of indigestion.

The irritation caused by their presence is not easily distinguished from other forms of indigestion and colic. It may be tympanitic or not, accompanied or not with diarrhœa, and of the most variable intensity. If occurring after a period of abstinence when the worms are presumably hungry, or if in spring or early summer, if the bots are found passing with the dung, if the horse turns up his lip, as if nauseated, and if the margins of the tongue are red and fiery, there will be so much more corroborative evidence.

Treatment.—In cases of irritation following abstinence give potatoe juice, gruels, etc., to feed and quiet the bots, adding some anodyne (opium, hyacynamus,) or mucilagin-

ous agents (gum Arabic, boiled linseed, mallow, slippery elm,) if it appears necessary.

We cannot certainly kill the bots in the stomach, as they will resist the strongest acids and alkalies, the most irrespirable and poisonous gases, the most potent narcotics and mineral poisons, empyreumatic oils, etc. Oil of turpentine, bryony, ether and benzine have been relied on by different practitioners, but none of them are quite satisfactory. It seems probable that these like other vermifuges will act best in autumn or early winter before the larva has acquired his hard, horny coat of mail, and at this time accordingly they may be given with more confidence. The azedarach (pride of China) grown around stables in the South to protect from bots, probably acts in this way, if at all, being cropped and swallowed by the animals while the bots are still white, soft, and permeable to liquids.

The colics are to be treated by anti-spasmodics (tobacco, stramonium, laudanum, etc.,) and mild laxatives, and the animal must be well fed to support him under the drain, and to keep the parasite gorged, lazy, and non-irritant. In summer when the bots are coming away their exit may be precipitated by a good dose of physic.

Prevention.—Trim off the long hairs of the jaws, breast, shoulder and fore limbs, and apply a little oil daily to prevent the eggs from adhering. Or brush off the eggs with soap-suds daily before they have had time to hatch in the sun. A piece of cloth extended across beneath the jaws is often employed to protect this part.

RAT-TAILED MAGGOTS, the larvæ of *helophilus*, are also found in horses' intestines, but are not known to be injurious.

INTESTINAL WORMS.—These are arranged in four classes: 1. The *tape-worms*, consisting of flat bodies made up of a succession of segments or links, with a narrow neck and small head, and divided into tape-worms proper, which are round-headed and bothriocephali, which are flat-headed with lateral openings; 2, the *flukes* soft-bodied, flattened, leaf-like or ovoid worms.

with digestive organs and a variable number of suckers in gills; 3, the *thorn-headed worms*, with long rounded bodies and retractile snouts furnished with hooks, by which they attach themselves to the mucous membrane, but neither mouth nor digestive canal; 4, lastly, the *round worms*, which differ from the last in the absence of a protractile, hooked snout and the possession of mouth and digestive canal. The horse harbors in his intestinal canal at least three tape-worms and seven round worms; the ox, two tape-worms, two flukes, and five round worms; the sheep, one tape-worm, one fluke, and seven round worms; the pig, one thorn-headed worm and five round worms; the dog, thirteen tape-worms, one fluke, and five round worms; the cat, five tape worms, three flukes, and three round worms; the rabbit, one tape-worm and three round worms; the goose and duck, nine tape-worms, seven flukes, one thorn-headed worm, and seven round worms; the chicken, four tape-worms, two flukes and seven round worms; and the turkey and pigeon, at least two round worms each. Of these eighty-eight worms of the digestive organs it is useless to attempt any description in a work of the present limits, so that our attention must be mainly confined to their symptoms and treatment. For further information the reader is referred to the author's larger work, or to those of Leuckhart, Diesing, Dujardin, Baillet, Cobbold and other helminthologists.

The transformations of tape-worms have been already referred to under *parasites*, and those of flukes under *diseases of the liver*. The *thorn-headed worms* lay their eggs within the body of their host, and these being passed with the dung are swallowed by crustaceans, in which they encyst themselves and develop the characters of the adult worm in miniature, but remain very minute and fail to attain their full size till their host is swallowed by another animal. Among domestic animals ducks and pigs harbor these, probably because of their carnivorous appetite. The *round worms* mostly live in their young and immature condition, out of the body, in water or moist earth, or on vegetables (see *lung worms*, *verminous bronchitis*.) but some are exceptions, like the common

pin-worm of the horse (*Sclerostomum Equinum*) which lives in pill-like masses of dung, in little pouches and closed cysts of the mucous membrane of the large intestines and in dilatations of the blood-vessels, especially the arteries of the bowels. This, with two other common pin-worms of the horse (*Sclerostomum Tetracanthum*, *Oxyuris Curvula*), are each about an inch in length, and all inhabit the large intestine in their adult condition, sometimes becoming so numerous in a district as to cause an epizootic. Another round worm (*Ascaris Megalacephala*) about six inches long, is very common in the horse's small intestine.

Cattle suffer less from intestinal worms, but the following are not infrequently injurious, especially to calves. The long tape-worm (*Tænia Expansa*), *Ascaris Bovis* (like a common earth-worm), the hair-headed worm (*Tricocephalus Affinis*), the *Sclerostomum Hypostomum* and *Strongylus Radiatus*.

Sheep suffer severely, especially from the long tape-worm, *Sclerostomum Hypostomum*, *Strongylus Fillicollis*, *S. Contortus*, *Dochmius Cernuus* and *Tricocephalus Affinis*. The thick portion of the body of the last is about an inch long, the other round worms are mostly under an inch and a half. The tape-worm is usually three feet or under, but is alleged to gain a length of twenty, thirty and even one hundred feet.

Swine suffer severely from a thorn-headed worm (*Echinorhynchus Gigas*) from three to eighteen inches long; a hair-headed worm (*Tricocephalus Crenatus*) a little smaller than the ruminant's; an ascaris (*A. Suilla*) like that of ruminants; the *Sclerostomum Dentatum*, three to five lines in length, and the *Trichina Spiralis*, one-eighteenth to one-sixth inch long.

In addition to the tape-worms mentioned in the general articles on parasites, the dog suffers much from others, as from the following round worms: *Ascaris Marginata*, two to four inches long; *Spiroptera Sanguinolenta*, one and one-half to three inches long; *Strongylus Trigonoccephalus* and *Dochmius Trigonoccephalus*, each under one half inch; and *Tricocephalus*

Depressiusculus, the thick part of which is about one-half inch. One worm of the cat, *Ascaris Mystax*, one to three inches long, deserves mention because of its being harbored also in the human intestine.

General Symptoms of Intestinal Worms.—These are shown when worms are present in large numbers, when they attach themselves to the mucous membranes or when they bore through these to reach other parts. There are general signs of ill health, poor condition, pot-belly, hide-bound, a scurfy, dry state of the skin, often with itching, irregular and usually voracious appetite, foetid breath, diarrhoea alternating with costiveness, the passage of mucous with the dung, slight colicky pains with tympany, especially in the morning before feeding, a puffy swelling and itchiness of the anus, which is often surrounded with a fur of dried mucous, and above all, the passage of worms or their eggs.

In the horse there is often a tendency to elevate the upper lip and to rub it against wall or manger, to lick earth or lime, or to shake the tail or rub out the hair about its root. There may, though rarely, be severe flatulent or spasmodic colic, enteritis or peritonitis.

In cattle there are advancing emaciation, depraved or variable appetite, impaired rumination, colics, tympanies and foetid breath.

Sheep lose appetite, scour, suffer from thirst, wasting, bloodless eyes, clapped, unhealthy or shedding wool, a desire to eat earth, itching anus, shown by frequent shaking of the tail, and finally dropsical effusions in the chest and belly and beneath the lower part of the body. They become dull, hopeless-looking and leave the flock.

Swine, beside the general symptoms, have unusual voracity, and yet lose flesh, cough, scour, start from rest or sleep with a sharp cry, scream excessively just before feeding, have colicky pains, tender abdomen and vomiting, and many even suffer from palpitations (thumps), vertigo or convulsions.

Dogs suffer from inordinate appetite, wasting, itchy skin, staring coat or loss of hair, indigestions, colics, occasional scouring or vomiting, foetid breath and itching

anus, shown by their frequent licking it or drawing it along the ground. Like swine, they may show irritable temper, starting without cause, palpitations, vertigo or convulsions.

Treatment.—This may be divided into the administration of agents to kill the worms, of purgatives to carry off them and their eggs, and of tonics to overcome the weakness and the accumulation of mucous in which they live and thrive.

The *diet* for *herbivora* should be grain in summer, or in winter sound, natural hay salted, with carrots, turnips or beets, and, in the horse at least, some of the more nutritive grains (oats, barley, beans, corn, linseed cake, etc.) ground or unground. *Pigs* may also have green food, roots, a liberal supply of grain, and, if available, buttermilk. *Dogs* may have salt meat, with soups and milk.

Before giving a vermifuge let the bowels be cleared out by a purgative (horses, aloes; ox or sheep, Glauber salts; swine, dog or chicken, castor oil). It should also be given fasting before the morning's feed, and, if the worms exist in the large intestines, by injection as well as by the mouth.

A great list of *vermifuges* may be mentioned, some destructive to intestinal worms in general; others particularly adapted to specific parasites; while some that are safe and efficacious for one class of patients would prove poisonous to another.

One class destroys worms by the mechanical irritation of their skin and perhaps their intestinal canal. It includes iron filings, granulated tin or tin filings, very finely powdered glass and cowhage. These are given in doses of $\frac{1}{2}$ oz. to the large quadrupeds, 1 dr. to sheep and swine, or 1 scr. to dogs, made into a ball with linseed meal and syrup. They may be repeated daily for a week, and followed by a smart purge.

Bitters (quassia, cinchona, gentian, wormwood), are often beneficial, though mainly acting as tonics. For worms in the last gut a concentrated solution as an injection acts well.

Among the more direct vermifuges are: Common salt allowed to be licked at will (must not be mixed in large amount in the food of swine or chickens); oil of turpentine; calomel; tartar emetic with sulphate of iron, for six mornings running, and followed by a purge; empyreumatic oils, and especially those coming off at a slightly lower temperature than creosote and carbolic acid; azedarach; *Spigelia marilandica* (pinkroot); santoline; sulphuric ether; asafetida; tansy; savin, etc. These are general vermifuges, and may be used especially for the round worms.

For *tape-worms* use areca nut; kousso; root of male shield-fern; pomegranate root bark; kameela; pumpkin seeds; *ailanthus glandulosa*; or oil of turpentine. In every case the agent should be given fasting, it may even be repeated at the end of four hours, and should be followed by a smart purge. For weak animals areca nut is especially suitable.

A course of tonics (sulphate of iron, gentian, columba,) should follow with sound nourishing diet and pure water.

In the case of the *Sclerostomum Equinum*, it will usually be needful to repeat the treatment at short intervals to kill the young worms, which have escaped because of their being buried in the mucous membrane.

Prevention is to be sought by measures advised under lung-worms, especial attention being given to sound nourishing food and pure water.

CHAPTER IX.

DISEASES OF THE LIVER.

Effects of deranged functions of the liver. General symptoms and causes. Saccharine urine, Diabetes Mellitus. Blood-poisoning from imperfect oxidation of albuminoids, Azotæmia, Azoturia, Enæcetic Hæmaturia, Spinal Meningitis. Red-water in cattle, sheep and pigs. Wood Evil. Jaundice, Icterus, the Yellows. Congestion of the liver. Rupture of the liver. Inflammation of the liver. Hepatitis. Chronic inflammation of the liver. Result of hepatitis. Gall-stones. Biliary Calculi. Fatty degeneration. Tubercle. Cancer. Hypertrophy. Atrophy. Parasitic diseases of the liver. Liver-rot, Fluke-disease. *Fasciola Hepatica*. *Distomum Lanceolatum*.

Only now, when the functions of the liver are being more fully discovered, do we begin to apprehend the full importance of its various disorders. Formerly this organ was supposed to have exhausted its functions in the secretion of bile, and the various modifications and impaired discharge of this product, together with inflammation, morbid growths and degenerations, circumscribed the list of hepatic diseases. But the recognition of the formation of glycogen and cholesterine in the liver, together with urea and other less perfectly oxidized nitrogenous bodies which pass into the blood in place of being discharged with the bile, points to the liver as the chief local seat of various disorders, such as diabetes, cholesterine plugging of vessels, blood-poisoning from imperfectly oxidized albuminoids, and urinary calculi.

General Symptoms.—These may be stated shortly as follows: obesity, sluggishness, irregular bowels, the dung being abundant, liquid and deep yellow or orange, from excess of bile in active congestions of the liver, or on the contrary there may be costiveness, with light-colored, foetid, imperfectly digested stools in cases in which bile is not secreted or is debarred from entering the bowels by some mechanical obstruction; lameness in the right

fore limb, or even in one or more of the remaining members, without any observable local cause; cramps and even paralysis in the severer cases with poisonous products thrown into the blood; a tardy pulse, sometimes not more than half its natural number; yellow or orange color of the eye and other visible mucous membranes, and of the urine in cases of obstructed bile-ducts or intestines with reabsorption of bile, or in destruction of blood-cells by taurocholic acid and other products abnormally present in the blood; tenderness or groaning when the last rib is pinched or struck with the closed fist; a yellow or orange fur may sometimes be seen universally diffused or in circumscribed spots on the upper surface of the tongue; the presence in the urine of deep brown or reddish granular deposits replacing urea is another sign of liver disorder. Obstructed circulation in the liver causes congestion of the portal vein, engorged spleen, intestinal catarrh, effusion of blood on the bowels, piles, dropsy of the abdomen, and swelling of the hind limbs. These may therefore be attendant symptoms.

The conditions in which animals live may further assist our decision in suggesting an efficient *cause*. The fat, idle, over-fed and pampered stock are especially subject to liver disease, and more particularly if kept in close, hot, damp buildings or climates, or supplied with putrid water or unwholesome food. Thus the pampered family horse, the idle farm horse during our long winters, the high-bred ox, sheep or pig, in which everything has been sacrificed to secure excellence as meat producers, the pet dog, and the Brahmas, Cochins and other plump hens of Asiatic extraction, present frequent examples of liver disease. The stabled animal is more subject to it than those running at pasture, and the subject liberally fed on dry fodder than that nourished on succulent green food. Then the denizen of the warm latitude and damp miasmatic soil is more liable than others.

SACCHARINE URINE, DIABETES MELLITUS.—Very rare in the lower animals, but has been seen in carnivora (dogs), omnivora (monkeys), cattle and even in the horse.

Temporary sweetness of the urine is not disease, but if permanent it may be referred to excessive production of glycogen in the liver, which is probably always enlarged (Bernard); or less frequently to the failure of the liver to transform the sugar of the food into glycogen; or it may be from disease of the medulla oblongata (apoplexy), or of some part which exerts an irritant reflex action on the base of the brain. It has been produced experimentally by giving alcohol, ether, chloroform, quinia, ammonia, arsenic, phosphoric acid, and *woorali*.

Symptoms.—Rapid loss of condition, scurvy, unthrifty skin, costive bowels, indigestion, ardent thirst and excessive secretion of urine of a high specific gravity—horse and ox, 1060; pig, goat and sheep, 1030 and upwards. The tests for sugar are: 1, taste; 2, fermentation when yeast is added and the whole allowed to stand in a warm temperature; 3, the addition to a little of the urine in a test-tube of a few drops of solution of blue vitriol, and a considerable excess of potassa, and boiling the liquid for a moment, when, if sugar is present, there is a deposit of the yellowish-brown suboxide of copper.

Treatment.—Rarely successful. The best results are to be expected in cases in which an active cause, such as disease of the liver, lungs or brain, can be recognized and kept in check or cured. Thus, with liver disease, laxatives, alkalies, pure air and water, green or otherwise laxative food, and cupping, mild blistering, or even leeching over the spare rib may be beneficial. In lung disease the treatment must correspond to its nature, whether inflammatory, tuberculous or otherwise. Tonics and stomachics are almost always demanded. All the bitters, tincture of iron, the mineral acids and carbonate of soda have been used with profit. Opium, which checks the excretion of sugar, is injurious by impairing digestion. Lactic acid has repeatedly succeeded at the expense of a severe attack of rheumatism. Free secretion from the skin is beneficial and should be encouraged by warm clothing, baths and climate. Diet should be mainly albuminous, such as bran mashes and gruels, peas, beans, vetches, flesh deprived of fat, etc.

BLOOD-POISONING FROM IMPERFECT OXIDATION OF ALBUMINOIDS.—AZOTÆMIA.—AZOTURIA.— ENZOOTIC HÆMATURIA.—SPINAL MENINGITIS.— Variousl described in the books as disease of the kidneys and spinal cord, this is really due to disease of the liver, which fails to effect the transformation of albuminoids into urea, and entails an accumulation in the gland and in the circulating fluid of partially oxidized products, such as leucin and tyrosin, which pass off in variable amount by the kidneys. It attacks almost exclusively horses which have stood idle in the stable for a few days, on good diet, and are then taken out and subjected to active exertion.

Symptoms, etc.—These are very variable. In the *mild-est forms* there is only some lameness and muscular trembling in a particular limb, without apparent cause, brought on by sudden exertion, and attended by a dusky brown color of the membranes of the eye and nose and some signs of tenderness when the short ribs are struck. This may be entirely cured by a course of gentle laxatives (podophyllin, 1 scr.) and diuretics (colchicum, muriate of ammonia, taraxacum, nitre,) and a gradual inuring to work, beginning with the slightest exertion, and increasing day by day as the condition improves. The *worst form* comes on during or after driving, it may be not more than one hundred yards, the fire and life suddenly giving place to anxiety and despondency, the subject seems to be in violent pain, the flanks heave, the nostrils are dilated, the face is pinched, the surface drenched in perspiration, the body trembling violently, the limbs weak, so that they sway and bend, while the animal walks crouchingly behind, and soon goes down unable to support himself. If urine is passed it is high-colored, dark brown, red or black, and is usually thought bloody, but it contains neither clots nor blood-corpuscles, its color being due to the imperfectly oxidized albuminoids mixed with an excess of urea. When the patient is down the limbs and whole body are still convulsed at intervals, but are beyond the control of the animal, showing the poisonous effect on the nervous system. The pulse is

variable but high, and the temperature of the body normal at first, though it rises slightly if the animal survives. Death may ensue in a few hours or days, or improvement manifested at any period may go on to complete recovery. The blood is dark, diffuent, clots loosely if at all, and smells strongly. In some cases of recovery a partial paralysis of the hind limbs or wasting of the crural nerve and muscles above the stifle will sometimes persist for a time, showing structural nervous disease.

Prevention is to be sought by regular daily exercise. In the case of horses which have had a period of absolute repose, submit to walking exercise only at first, and increase this day by day until they have attained good, hard condition.

Treatment.—Clear out the bowels and unload the portal vein and liver by active purgatives. Podophyllin $\frac{1}{2}$ drachm, aloes 4 drachms, may be given by the mouth, and copious injections of soap-suds, with oil or salts, by the anus, until the bowels respond, in which case a favorable termination may be hoped for. Drachm doses of bromide of potassium may be given frequently to calm nervous disorder, and when the bowels have responded, half drachm doses of colchicum and drachm doses of muriate of ammonia three times a day. Warm fomentations to the body, but especially to the loins, are beneficial, alike in soothing irritation in the liver, spinal marrow and kidneys, and in securing a free perspiration and the elimination of morbid matters by the skin. They may be replaced by a newly removed sheep-skin applied with the fleshy side in, and followed by a mustard poultice. When the appetite returns the diet must be of sloppy mash and moderate in quantity.

In case the paralysis persists after the acute symptoms have subsided, treat as for functional paralysis.

WOOD EVIL.—RED WATER OF CATTLE, SHEEP AND PIGS.—Under this name we designate a malady generally described as bloody urine (*hæmaturia*), but as the liquid does not usually contain blood globules or clots, and as the liver is almost invariably enlarged and soft-

ened, and the blood elements are largely destroyed, it must be conceded that the affection is more intimately associated with disorder of the hepatic functions than of any other. The cause, which may be stated as feeding on irritant and unwholesome food, is such as is calculated to disorder the digestive organs and liver. The blood seems to suffer secondarily, though it is by no means disproved that other blood-forming functions besides those of the liver are involved. The blood itself is usually thin, watery and comparatively incoagulable, with a deficiency of fibrine, albumen and red globules—the last named elements being smaller than natural and irregularly notched around their margins. The urine varies in color from a simple reddish tinge through the various shades of red and brown to black. It contains albumen and various albuminoid agents, excess of urea, cholesterine and phosphates, implying hepatic disturbance and destructive changes taking place in the blood.

This is essentially a disease of unimproved localities, and attacks animals fed too exclusively on products of such land, which are naturally stimulating to the digestive organs and liver. Turnips and other saccharine roots, though perfectly safe from ordinary soils, are dangerous from these, and in the natural meadows and woods the young shoots of resinous trees (*coniferæ*) and the acrid plants of the *ranunculus*, *colchicum* and *asclepias* families, etc., are held to produce it. Its prevalence in woods and uncultivated meadows has procured for it in almost all European countries some name equivalent to *wood disease*. An important element in the causation is the existence of soil rich in organic matter and soured by the stagnation of water owing to a clay or otherwise impervious subsoil. Cows are very susceptible just after calving, and often perish.

Symptoms.—Dulness, languor, weakness, especially of the hind limbs, trembling, surface coldness, staring coat, dry muzzle, hot mouth and horns, and diminution of the milk, which is white and frothy and may throw down a reddish sediment. Appetite is lost, thirst ardent, pulse small and weak, beats of the heart tumultuous, amount-

ing to palpitation in the parturient cases, bowels at first relaxed, afterwards costive, abdomen tender, urine passed frequently in small quantity and often with suffering. Colicky pains are often a marked symptom when the irritation of the bowels is extreme. Delirium even will set in in bad cases, and death usually supervenes on a state of extreme prostration.

Prevention may be sought in thorough drainage; in restricting the allowance of objectionable food, and supplementing it with sound, dry grain and fodder; in the avoidance of damp, woody and natural meadows in spring until there is a good growth of grass, and in the rejection of hay from faulty pastures containing an excess of acrid plants.

Treatment.—At the onset of the disease nothing succeeds better than a free evacuation of the bowels and depletion of the portal vein and liver by an active purgative. When there is no abdominal pain or other sign of inflammation of the bowels, salts or any other active purgative will suffice, but with colic and tenderness of the abdomen, we must restrict our choice to olive oil and other bland materials. In advanced and weak conditions, decoctions of linseed should be resorted to. The animal is to be supported by diffusible stimulants and iron tonics, with chlorate of potassa, and the bowels sheathed and protected by infusions of slippery elm, or mallow, decoctions of linseed, eggs, milk or mucilage; diet should consist of linseed decoctions, well-boiled gruels, bran mash, and other nutritive and easily digested food.

JAUNDICE.—ICTERUS.—THE YELLOWS.—This name is given to that condition in which the visible mucous membranes, the skin—if white,—the urine and the tissues are stained yellow, orange or brown by bile coloring matter. It is only a symptom of various disorders, but it is so specific in its character that the name bids fair to be retained for the state. It is not caused, as once supposed, by the non-secretion of bile from the blood, but by the re-absorption of bile already secreted.

This absorption may be determined by various cases, 1. Obstruction of the bile duct, by gall-stones, parasites, foreign bodies entering from the gut, fibrous or spasmodic stricture of the duct, inflammation or ulceration and swelling of the mucous membrane of the canal, or the intestine near the opening, tumors, or overloaded intestines. 2. Obstruction of the bowels which hinders the discharge of the bile. 3. Diminished fulness of the capillary vessels of the liver from partial mechanical obstruction of hepatic artery or aorta. 4. Excessive secretion of bile in congested states of the liver.

Jaundice may also result from imperfect metamorphosis of the re-absorbed bile, as in certain fevers (anthrax, Texan-fever, hog cholera, purpura hæmorrhagica,) in blood poisoning (septic matter, snake venom, phosphorus, mercury, copper, antimony, chloroform, ether, carbonic acid). It may further result from the breaking down of red blood-globules and liberation of their coloring matter to stain the blood and textures. This may be caused by excess in the blood of water, bile acids (taurocholates), alkalies, nitrites, ether or chloroform. It may result from freezing, burning (140° F.), and frictional and induction currents of electricity. It is noticeable that the coloring matter in the blood of solipeds is very easily dissolved, and that of carnivora only with difficulty. Hence the frequency of a dusky or jaundiced appearance of the membranes in horses and its comparative harmlessness, as contrasted with similar conditions in the dog. It is further probable that the re-absorbed bile acids are transformed into bile pigment in certain states of the blood.

Symptoms.—General coloration of all the tissues, but especially the mucous membranes of a yellow, or over large veins of a greenish hue, and also of the urine. When there is obstruction of the bile-duct, the dung is devoid of bile, foetid and often clayey in appearance, but if from other causes it may retain its natural color and odor.

Other symptoms may appear dependent on the nature of the attendant disease, or the poisonous action of the

bile acids, and of various diseased products on the blood, while the coloration itself seems to be comparatively harmless.

Treatment.—This will depend on the nature of the cause. As a general rule what favors the action of the bowels, the free elimination of the bile and depletion of the portal vein and liver, will counteract the jaundice. Small daily doses of podophyllin, (horse and ox 1 scr.) with one or more ounces each of Glauber, Epsom and common salt, as may be needful, will often act very efficiently. Or aloes, jalap or calomel may replace the podophyllin. Taraxacum may be given either in diuretic or purgative doses, or a herbivorous patient may be turned out on a pasturage of dandelion; succulent spring grass, indeed, is sometimes all that is needed. Diuretics are useful in effecting elimination of the pigment, the carbonates and acetates of potassa, soda and ammonia being especially good. Bitter and other tonics are often valuable in counteracting that impairment of tone which favors congestion and swelling of the stomach, intestine and liver, otherwise the treatment must correspond to the nature of the cause, when that can be ascertained.

CONGESTION OF THE LIVER.—This is common in horses in warm climates, where luxuriant grasses (plethora) and hot seasons strongly predispose. Hence, in the Southern States, and especially in localities which are moist as well, and where malarious emanations exist, it may be looked for, but it is also seen in pampered, idle animals, kept in hot, close stables anywhere. Rich food and the comparative absence of waste by exercise and breathing throw too much labor on the liver, which is rendered liable to clogging and congestion. Among the immediate exciting causes may be named sudden changes of temperature, emigration from a cold to a warm, damp region, chills in cold dewy nights after hot days, sudden exertion when unfitted for it by long rest and bad condition, exertion under intense heat of the sun, and blows on the region of the liver, particularly on the young. Venous congestion from imperfect action of

the heart valves is a cause of hepatic congestion, at once predisposing and exciting.

Symptoms.—These strongly resemble the severe forms of poisoning, by imperfectly elaborated liver products, the two conditions being often co-existent and mutually dependent on each other. There are the sudden prostration, dull, sunken eyes, pinched, anxious face, excited breathing and pulse, trembling, swaying limbs, perspiration, sighing, and violent colicky pains with frequent looking at the flank, lying down and rising. Striking the last ribs with the fist causes flinching, groaning, or even attempts to kick or bite, and some jaundice and furring of the tongue are often seen. When fainting ensues, this, with the pallid mucous membranes and quick, weak pulse, imply rupture of the liver and extensive loss of blood. In the slighter attacks the symptoms are correspondingly mitigated. The attack may subside and end in complete recovery, or blood effused into the substance of the liver may be slowly absorbed, or organized into fibrous material, or may determine extensive and fatal softening of the liver, or finally, the patient may perish in a fainting fit from rupture of the liver and loss of blood.

Treatment.—At the outset a free bleeding will often obviate effusion of blood and rupture and check the disease. It must never be resorted to, however, when faintness, a weak, small pulse, or a small stream from the orifice implies already existing effusion. Quiet, mustard poultices or other derivatives applied to the limbs, and saline purgatives (1 lb. sulphate of soda), by the mouth and as injections, will prove valuable in directly depleting the portal system and liver. Cold water or ice to the last ribs will often serve to check effusion already begun. The sulphate of soda may be kept up in small doses (1 to 4 ozs. daily), and a mustard or other blister may be applied over the region of the liver. During treatment the animal must have the purest air, and, as food, soft bran mashes and roots. After recovery feed moderately on sound easily digested food, keep in pasture or airy stable, and never neglect moderate exercise even for a day.

INFLAMMATION OF THE LIVER.—HEPATITIS.—Due to the same causes as congestion but much less frequent. In dogs, beside the general causes, we must acknowledge the influence of sharp-pointed bodies swallowed in wantonness, and splinters of bone which perforate the stomach and liver.

Symptoms.—At first those of slow congestion already referred to. As active inflammation sets in there is less violent pain and excitement and more fever. The pulse is accelerated, the breathing quickened, especially in inflammation of the liver capsule, the region of the last ribs is very tender to a blow (on the right side only in ruminants), the mouth hot and clammy, tongue furred, mucous membranes more or less dusky or yellow, and the heat of the body raised by 2° or upwards. The bowels may be at first loose, yellow and bilious, but soon are confined, the small pellets of dung being covered with a yellowish mucous, and this state may again give place to a mucous diarrhoea. Appetite is usually completely lost, emaciation advances rapidly, blood-spots and patches appear on the visible mucous membranes, and the legs, especially the hind ones, swell or stock. Great nervous atony, convulsions or even delirium may appear towards the last.

In *dogs* there is great dulness and muscular weakness, inclination to lie constantly, unsteady gait, dusky or yellow membranes, furred tongue, prominence of the last ribs on the right side and tenderness along them and their cartilages. When the disease is fully developed the tumid edge of the liver may be felt behind the last rib and the costal cartilages. A brownish, mucous diarrhoea succeeds to the preliminary constipation. Great nervous prostration and stupor usually precede death. The disease is very fatal in dogs, but may merge into the chronic form with ascites, or end in a perfect recovery.

Fowls, especially the less lively birds, suffer much from hepatitis when well fed and kept in a small poultry-yard. They may die suddenly of effusion of blood on the liver, without any previous signs of illness, or they may droop for some days or even weeks prior to death.

Any change in the habits of closely confined, plethoric fowls should lead to suspicion of liver disease. Ruffled feathers, sinking of the head between the wings, sluggishness in running or feeding, drooping in a corner alone, with a withered brownish appearance of the comb and jaundice of the skin are especially to be noted.

Treatment.—Bleeding is rarely beneficial, and we must rely mainly on depletion from the portal system and liver by purgatives, or counter-irritants and change of habits. A pound of sulphate of soda may be given at once to the larger animals, or an ounce to a shepherd's dog and an equivalent amount by injection. Podophyllin, aloes, etc., may be used instead. Friction, with loose bandaging of the limbs, with or without excitation by mustard, or ammonia and cupping, or in small animals leeching over the region of the liver or mustard poultices are demanded. After the bowels have been freely opened, smaller doses of Glauber salts or cream of tartar may be given daily to keep up a free action of the bowels, and throughout the diet must be soft (mashes, roots, green food), and restricted in quantity. Taraxacum with bitter tonics (Peruvian bark, gentian, columba, gelsemium, etc.) will be useful during convalescence, and when the herbivorous patient is well enough to be pastured in a field well stocked with dandelion, this may be resorted to. In carnivora and swine ipecacuanha and guaiacum are useful in favoring free elimination by the bowels and skin.

Fowls attacked usually die, but the morbid state in which the disease takes its origin may be counteracted in the remaining fowls by a free range, by cabbage, cooked potatoes, turnips and other vegetable food in place of grain, and a small quantity of salt or Glauber salts in the food or water. Excess of common salt is poisonous.

CHRONIC INFLAMMATION OF THE LIVER.—This is seen especially in horses and dogs, the liver often attaining an enormous size or undergoing fibrous degeneration (cirrhosis). It is attended by the same symptoms as the

acute form, but these are less urgent, and dropsy of the belly and legs is a common result.

It is to be treated in the same manner as the acute form, but less energetically, mild laxatives with bitters daily, and, above all, a free range in the open air; for herbivora, sound, juicy pastures, and in case of a malarious soil or impure water, a change even for a few miles to a higher locality.

GALL-STONES.—BILIARY CALCULI.—These are especially common in oxen when subject to the dry feeding of winter, but are found in all domestic animals, often in great numbers. They occur as round masses, angular masses when they have lain in contact, or as incrustations on the walls of the duct, of which they form distinct casts. They often fail to cause manifest disorder, but if they obstruct the ducts there is acute spasmodic pain in the abdomen, with all the signs of colic, tenderness over the last ribs, and more or less jaundice. The attacks are liable to recur as new calculi are displaced, and the general health suffers. Carnivora vomit, and in all diarrhoea may set in if relief is not obtained. Sheep generally have incrustations when affected with flukes (liver rot).

The formation of these calculi may usually be *prevented* in herbivora by allowing a fair amount of exercise and succulent food, and they nearly always disappear in cattle turned out on the rich grasses of spring. Beside these measures their removal may be sought by the daily use of carbonate and sulphate of soda and common salt, with abundance of good water and exercise. During the attacks give anti-spasmodics, lobelia, belladonna, hyoscyamus, chloral-hydrate, etc., and keep up hot fomentations perseveringly to the loins and abdomen. Chloral-hydrate and chloroform dissolve cholesterine calculi.

OTHER AFFECTIONS OF THE LIVER, *fatty degeneration, tubercle, cancer, hypertrophy, atrophy*, are manifested by the general symptoms of hepatic disorders, but space forbids further notice of them here.

PARASITIC DISEASES OF THE LIVER

LIVER-ROT.—FLUKE DISEASE.—This affection is most destructive to sheep, of which it has destroyed as many as from one to two million head in England alone in certain years. It is immediately determined by the presence in the gall ducts of two flat, leaf-like parasites—the *Fasciola Hepatica* and the *Distomum Lanceolatum*—the first $\frac{3}{4}$ to 1 inch in length, the second 4 lines. These inhabit the gall ducts of all domestic animals, of many wild animals and even of man, but in most of these they do little harm. The eggs of these parasites laid in the gall ducts cannot be developed there, but pass out with the bile and dung, hatch in pools of fresh water, in which the embryo floats until it finds a mollusk, in which it encysts itself and becomes a brood capsule, developing many new embryos within it; these embryos may form new brood capsules, and thus increase their number materially, or if swallowed by a mammal along with its food or water, they develop into the mature flukes, inhabiting the bile ducts and reproducing themselves only by eggs. The necessity for these intermediate generations, and the fact that they can only take place in fresh water and fresh water mollusks, points to thorough drainage as the most efficient means of limiting the ravages of the parasites.

In small numbers they do little harm, and as they cannot multiply within the body their presence may be of no consequence, but when present in large numbers they become most destructive. In certain damp lands stocked with these parasites sheep cannot live, no matter how well fed, and cattle often perish as well. A single infected sheep brought on such damp lands will speedily infect them, as infested German rams did the colony of Victoria in 1855.

Symptoms.—Sheep may thrive unusually for a month or two, but soon they begin to lose flesh and waste with a rapidity that is surprising. The skin and the membranes of the nose and eyes become soft and puffy, the naturally bright pink vessels of the eye become yellowish, dark or even quite imperceptible, the whole eye

assumes a yellow tinge, the skin is pale, bloodless, deficient in yolk or oil, dry and scurfy. The wool loses its brilliancy and comes out easily when pulled. The muscles waste, the animal is *razor-backed*, the hip-bones project, and the flank becomes sunken, the belly pendent and the back drooped from dropsical effusion. Similar effusions take place in the chest, beneath the abdomen and breast-bone and under the lower jaw. The head is no longer carried erect, the expression of the face is haggard and hopeless, the appetite is capricious, thirst ardent, and there is occasional diarrhœa. Examination of the dung detects myriads of microscopic eggs 1-180 inch in diameter.

Treatment.—Almost all the tonics of the pharmacopœia have been employed with more or less effect, but all usually fail when many parasites have gained access to the system. The following is a good example of a tonic mixture:

Linseed, rape, pea, oat, barley or unbolted wheat flour -	40 lbs.
Powdered gentian or anise seed -	4 "
Common salt -	4 "
Sulphate or oxide of iron -	1 "

Give half a pint daily to each sheep.

In all treatment it is essential to remove from the infested meadow to a perfectly dry pasture or salt marsh, on either of which the eggs of the fluke will perish. To turn on a wet fresh pasture is merely to stock that with the parasites.

Prevention.—Keep sheep on high dry pastures or salt marshes where the fluke cannot live out of the body. Feed salt daily if flukes exist to however limited an extent; this is fatal to the young flukes, and will destroy most of them as they are taken in. Thorough drainage of infested pastures will make them wholesome. This may fail when land is subject to inundations, and in this case such land should be devoted to raising hay or other crops. Keeping the sheep off the infested fields at nights and until the dew leaves the grass in the morning, will go a long way towards protecting them. In some in-

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stances of the introduction of this parasite into a new country the contaminated sheep should be destroyed and the infested pasture, with a wide area around it, proscribed from being grazed.

For other parasites of the liver, see general article on "PARASITES."



STEED OF THE DESERT

CHAPTER X.

DISEASES OF THE PANCREAS AND SPLEEN.

Diseases of the pancreas: inflammation, degeneration, calculi, etc. Diseases of the spleen: tuberculous, cancerous, glanderous, inflammatory, congestive, apoplectic. Hypertrophy, Atrophy, Lymphadenoma, Leukæmia.

DISEASES OF THE PANCREAS.—Though subject to a variety of diseases, as shown by the existence of abscess, tuberculosis, sarcoma, melanosis, cancer, calculi, and worms (*Sclerostomum Equinum*) after death, this organ is so deeply seated and the result of its disorder so little manifest, that its pathological states usually pass without recognition during life. One symptom alone is characteristic—the passage of much undigested fat with the dung. The fatty aliment is mainly emulsionized by the pancreatic juice, and its presence in the stools unchanged may be held to imply suppression of that secretion. If this condition coincides with general fever, colicky pains and tenderness behind the last rib on the right side, *inflammation* of the gland may be suspected; if with sharper colic but without fever, *obstruction of the pancreatic duct by calculi* will be suggested.

Inflammation should be treated on general principles by laxatives, blisters to the right side of the abdomen and spare diet; *Calculi* by antispasmodics and fomentations as for gall-stones; and simple *suppressed secretion* by *sulphuric ether*.

DISEASES OF THE SPLEEN (MILT).—These are, if possible, even more occult than those of the pancreas. And yet this organ is involved in nearly all diseases of the liver, in specific fevers due to a poison in the blood, and in disorders of the lymphatic vessels. Obstructed circulation through the liver sends the blood back on this organ and over-distends it almost to rupture.

Advanced tuberculosis and cancer rarely fail to show secondary deposits here. Glanders sometimes show the same tendency. Anthrax and anthracoid affections and, to a less extent, other specific fevers, lead to enlargement and even rupture of the spleen, in connection with the long retention of the blood and disease poisons in its venous cavities. Of particular diseases the spleen suffers from *wasting* in starved animals, from extraordinary *increase* in the highly fed, and from changes of structure, such as *glandular degeneration and enlargement (lymphadenoma)*. Some of these diseases, and notably the latter, are associated with an excess of white globules in the blood (*leukæmia*), which condition revealed by the microscope may assist in diagnosis.

We can do little for these affections besides giving attention to the general health, by tonics and a sound hygiene.



CHAPTER XI.

DISEASES OF THE URINARY ORGANS.

General causes and symptoms. Examination of the urine. Diuresis, Diabetis, Insipidus, Polyuria. Bloody urine, Hæmaturia. Simple inflammation of the kidneys, Nephritis. Bright's disease, Desquamative Nephritis. Albuminuria, Albuminous urine. Spasm of the neck of the bladder. Paralysis of the bladder. Inflammation of the bladder, Cystitis. Inflammation of the Urethra, Gonorrhœa, Gleet. Stricture of the Urethra. Eversion of the bladder. Urinary Calculi and gravel, Stone in the kidney, ureter, bladder, urethra and prepuce—in horses, cattle, sheep, pigs and dogs.

Diseases of the urinary organs are not infrequent in the domestic animals, though less prevalent than in man. They prevail above all in certain localities, as: on the magnesian limestones, in company with goitre, on lands abounding in diuretic or resinous plants or water, in damp regions where fodder is secured in a wet, musty condition where it is fed covered with hoar-frost, or where constant cold rains and winds repress the perspiration and throw undue work on the kidneys. Feeding to excess on aliments rich in phosphates of lime and magnesia—bran, beans, peas, vetches, etc.—the habitual privation of water, injudicious dosing with diuretics, diseased heart and lungs, which throws the blood back on the veins and determines passive congestion of the kidneys, diseases of the liver which interfering with the oxidation of the albuminoids predispose to urinary deposit, and finally mechanical injuries to the loins or pelvis, all tend to induce various urinary diseases.

General Symptoms.—With most acute inflammations there is a stiff straddling gait with the hind limbs, the loins are tender, as ascertained by pinching on the spines or the transverse processes of the backbone, there is less difficulty experienced in backing than when there is sprain or fracture of the back or loins, and the animal is

more likely to lie down though it costs an extra effort to rise, there is straining to discharge urine, which is passed in excess, in deficiency, in jets, in dribblets only, or not at all. In the larger animals the bladder and its excretory duct (urethra) are easily and satisfactorily examined by the hand introduced through the rectum or vagina, and any tenderness, flaccidity, swelling, over-distension or foreign agent (stone) is easily made out. In the smaller breeds of horses and cattle even, the kidneys may be reached in this way, and any heat, swelling, tenderness, etc., perceived. Then brain diseases, dropsies, and skin eruptions are common results of urinary disorder.

Examination of the Urine.—But a certain class of urinary diseases are only to be made out by examination of the urine. Beside the modifications of quantity and flow already referred to, this may be altered: *1st, in color*, as *white*, from saline deposits, *brown* or *red*, from blood clots and coloring matter, or from imperfectly oxidized albuminoids, *yellow* or *orange* from bile or blood pigment, *pale* or variously tinted from vegetable colors taken with the food; *2d, in density* as measured by a hygrometer (urinometer), the natural urine being in the horse and ox 1030 to 1060, pig and goat 1010 to 1012, dog 1020, and cat 1058; *3d, in chemical reaction*, acidity or alkalinity, as ascertained by blue litmus or red test-papers (healthy herbivorous urine is alkaline, turning the red papers blue unless after prolonged abstinence or a flesh diet; carnivorous and omnivorous urine is acid excepting when confined to a vegetable diet); *4th, in organic ingredients*, as when it contains albumen (coaguable by boiling or by strong nitric acid or in the horse giving the liquid aropy consistency), sugar, blood, bile, cylindroid microscopic casts of the uriniferous tubes or the eggs or bodies of worms; *5th, in its salts*, which may crystallize out in the system or at once after the liquid is discharged, or after cooling, or finally may have to be precipitated by chemical reagents.

DIURESIS—DIABETES INSIPIDUS.—POLYURIA.—Excessive secretion of urine. This may occur in any animal

from agents, medicinal or alimentary, which unduly stimulate the kidneys. The horse, however, is the most frequent sufferer, being more than any other animal subjected to reckless dosing by those about him with private nostrums and much advertised quack preparations, and to the exclusive use of musty and injured hay and grain. Musty hay, grain or bran is perhaps the most common cause, the noxious agent being probably the cryptogams produced on this damp, heated fodder. Musty oatmeal will even affect the human being. New oats, very watery food like the refuse of distilleries, and cooked food, seleniteous waters, acrid diuretic plants in the pastures or hay, exposure to extreme cold and wet, and excessive thirst consequent on feeding salt or on irritation of the stomach are other causes. Whole flocks of sheep sometimes suffer at once from acrid plants eaten.

Symptoms.—Frequent (often almost constant) passage of a very pale-colored urine in large quantities and of low specific gravity, insatiable thirst, rapid falling off in condition and spirits, sluggishness and weakness at work and perspiration on the slightest exertion. The discharges are comparatively inodorous and more like water than horse's urine, and contain little solid matter though the quantity of solids passed in twenty-four hours is in excess. The skin becomes rough and hide-bound and all the signs of ill-health set in, though the animal may suffer and survive for months or even a year. More commonly he dies early of exhaustion, or glanders supervenes and kills the patient.

Treatment is very successful in the early stages. Stop the use of faulty food and drugs and give dry wholesome hay and grain, with no suspicion of newness or mustiness. Give a decoction of flaxseed freely with the water drunk, with phosphate of iron 2 drachms, Peruvian bark 4 drachms, and iodide of potassium 2 drachms daily. Creosote may often be added with advantage.

BLOODY URINE.—HÆMATURIA.—This occurs after sprains of the loins or blows on this region, with stone in the kidneys, urinary passages or bladder, cancer,

tubercle or even abscess of the kidney, etc., or lastly some poisoned condition of the blood, as in malignant anthrax. Acrid diuretic plants, cantharides, May-bugs, etc., are occasional causes. When bleeding occurs from local irritation or in a tolerably healthy state of the blood, it is partly at least in the form of clots and fibrinous casts of the uriniferous tubes, about one-hundredth inch in diameter, and entangling blood-globules. If from poisoned and disintegrating blood, there is a diffuse coloration with hæmatine, with perhaps fragments of blood-globules, but rarely perfect ones, clots or casts, and a similar oozing of blood is liable to take place at other parts of the body. The blood-coloring matter is easily distinguished from bile by chemical tests. It is less easily distinguished from the brownish-red albuminoids which escape by the kidneys in Azotæmia. Beside the passage of the blood there may be the general signs of urinary disorder, but these are not constant. When gravel co-exists, gritty masses pass with the urine or collect on the hair of the prepuce.

Treatment.—Remove the causes, give comfortable, dry dwellings, sound food, mucilaginous drinks (linseed tea, mallow, gums, elm, etc.,) and acid astringents (tincture of chloride of iron, sugar of lead, vinegar, buttermilk and oak bark). In profuse discharge cold water may be applied to the loins, while in inflammatory cases a sheep-skin or poultice may be first used and followed by a mustard plaster. (See AZOTÆMIA AND RED-WATER.)

NEPHRITIS.—SIMPLE INFLAMMATION OF THE KIDNEYS.—*Causes.*—Blows or sprains in the region of the loins, stone in the kidneys, use of diuretics to excess, musty fodder, irritant or acrid plants in hay, too extensive blisters of Spanish flies, paralysis of the spinal cord.

Symptoms.—A variable but often very high fever, heat or even swelling of the loins, tenderness often extreme beneath the bony processes about six inches from the spine, a stiff, straddling gait with the hind limbs, little marked in chronic cases but so severe as to amount almost to helplessness in the worst, the loins arched, progression difficult and attended in some cases by groaning, there is

looking at the abdomen and colicky pains, more severe at one time than another. If the patient lies down it is with caution. In males there are alternate retraction and descent of the testicles, and in all there is likely to be frequent passage of urine in small amount, of a very high color and density, and containing fibrinous casts of the kidney tubes one-hundredth of an inch in diameter, and some times blood or even pus. The bowels are costive, and there is a rapid pulse, an elevated temperature, and excited breathing. The legs tend to swell uniformly from the foot up, and swellings may appear under the chest or belly, or even in internal cavities.

General ill-health, with stocking of the legs, casts in the urine and some tenderness of the loins to pressure, may be all that is seen in the chronic cases.

Treatment.—In acute cases, with strong pulse and robust patient, an immediate advantage may be gained by bleeding, but this is rare. Give a laxative of olive-oil or raw linseed oil, or in case of necessity of Glauber salts or aloes, accompanying this with an anodyne (opium, belladonna, tobacco), throw anodyne and mucilaginous injections into the rectum, and cover the loins with a fresh sheep-skin, the fleshy side in, or with a soothing poultice or fomentations, following this up in six or eight hours by a mustard poultice. Mucilaginous drinks may be given freely, but diuretics are to be sedulously avoided and warm clothing used to favor sweating and thus relieve the kidneys of work. Laxatives and anodynes must be repeated as may seem necessary, and finally a course of bitter tonics may be allowed.

ALBUMINURIA—BRIGHT'S DISEASE—DESQUAMATIVE NEPHRITIS.—This consists in inflammation of the kidneys, acute or chronic, with degeneration and shedding of the epithelium from the kidney tubes.

Symptoms.—More or less awkwardness of gait behind, and tenderness of the loins, in some cases indisposition to lie down, thick, gelatinous ropy urine, with microscopic casts of the kidney tubes, containing much spherical epithelium and granular matter. The urine coagulates in

part in whitish flakes when boiled, or under the action of corrosive sublimate, acetate of lead or nitric acid. The general health suffers, and the patient dies sooner or later of uræmia with dropsy, or of some other affection which has been aggravated by the impaired vitality and the excess of the elements of urine in the blood.

Treatment is not always satisfactory, though a certain proportion recover. Avoid exposure to cold, keep in a warm box and warmly clothed. Keep the bowels acting freely by a restricted diet of warm bran mash, etc., or even by laxatives. Give tonics (phosphate of iron, quinia, willow bark,) and mineral acids, and use mustard applications to the loins. If the kidneys fail to act, do not give diuretics, but use cupping over the part, or hot fomentations with water, or better still a strong infusion of digitalis.

Albuminous Urine, which is always ropy in horses, is no proof of the existence of Bright's disease, but is an attendant on nearly all extensive inflammations of important organs, on rheumatism, fevers and certain poisoned conditions of the blood.

SPASM OF THE NECK OF THE BLADDER.—Causes.—Prolonged retention of urine in mares at work or in horses hard driven. Chill when heated. Nervous irritation. Is a common attendant on severe colic, and gives way when that is relieved. Male suffer most frequently.

Symptoms.—Frequent attempts to urinate, which prove ineffectual or secure a dribbling only after much pain and straining. There may be anxious looking at the flank and uneasy shifting of the limbs, or in cattle twisting of the tail. There is tenderness in the back part of the abdomen in the median line below. The hand, oiled and introduced into the rectum, will feel the distended bladder, with its firm dense neck and no enlargement either there or backward in the urethra, as from stone.

If unrelieved the bladder becomes immoderately distended and finally bursts, especially in ruminants. This is followed by tenderness of the abdomen, febrile symptoms, dulness and languor, and if the bladder is exam-

ined it is found to be flaccid and tender. Perforation of the lower part of the abdomen with the nozzle of a hypodermic syringe allows the escape of urine, easily recognized by its odor.

Treatment.—Spreading fresh litter under the horse will sometimes induce staling. If not, use antispasmodics introduced by the rectum or even by the mouth (opium, laudanum, belladonna or hyoscyamus extract, tobacco smoke or solution, chloral-hydrate, lobelia, prussic acid, cyanide of potassium, etc.) Solutions of any of these agents may be rubbed on the perinæum. Sometimes the spasm will give way under gentle pressure on the bladder with hand or finger in the rectum. Finally, all other measures failing, the urine may be withdrawn with a well-oiled catheter. This should be $\frac{1}{2}$ inch in diameter for the horse, $\frac{1}{4}$ inch for the bull, and a line for the dog. Contrary to the usual statement, a small catheter may be passed in the bull when the penis is sufficiently extended to efface the S-shaped bend of the penis. In the mare the spasm may be overcome by the insertion of one or two fingers through the opening which is found in the median line of the floor of the passage about four inches from the external orifice. In the cow care is required to enter the central orifice, as there is a blind sac on each side.

PARALYSIS OF THE BLADDER may occur from excessive over-distension in connection with lock-jaw or rheumatism, which prevents stretching to stale, with cystitis implicating the muscular coat, spasm of the neck of the bladder, or decomposition of the urine. It is attendant on disease or injury of the terminal part of the spinal cord, on broken back, etc., and is then associated with palsy of the tail, and it may be of the hind limbs.

Symptoms.—If the neck is involved the urine dribbles away constantly, without straining, is discharged in the sheath and runs down inside the thighs, causing irritation and inflammation in both. If the neck is unaffected the urine accumulates in the bladder, causing over-distension,

irritation and rupture. The urine decomposes, setting free ammonia, which softens and dissolves the epithelium and establishes the worst type of cystitis.

Treatment.—In cases of broken back or disease of the spinal cord attention must be given to that, and, if remediable, the urine must be drawn off frequently with a catheter, to prevent over-distension and injury to the bladder. In local paralysis, or after the spinal cord has recovered, apply a blister (mustard) between the thighs beneath the anus or vulva or over the back part of the belly inferiorly. Give belladonna extract (1 to 2 drachms), cantharides (1 to 3 grains), or nux vomica ($\frac{1}{2}$ drachm for large herbivora).

INFLAMMATION OF THE BLADDER. — CYSTITIS.—

Causes.—Abuse of diuretics, acrid diuretic plants in the food, the application of blisters (Spanish flies, turpentine) over too extensive surfaces, prolonged retention and decomposition of urine, irritation from stone in the bladder, etc.

Symptoms.—If confined to the mucous membrane, urine is passed frequently, painfully, in small quantities, with more or less floating mucous and flat, microscopic, fibrinous shreds of exudation, entangling columnar or scaly epithelium. The bladder is very tender to the touch, and if the finger is passed into it in the female its neck and walls are felt to be thickened, sometimes enormously. There are colicky pains, frequent looking at the flanks, uneasy movement of the hind feet or twisting of the tail. The gait is stiff and straddling. There is fever, usually slight. If the muscular coat is involved there is distension of the bladder, and if the neck participates the urine escapes involuntarily. If due to unrelieved stone that will be found on examination.

The case is most hopeful if due to irritants or some clearly removable cause.

Treatment.—Remove the cause, whether foods, drugs, blistering agents on the skin, stone, gravel or retained and decomposed urine. Give spare, soft, aqueous diet, with mucilaginous agents (linseed decoction or tea, slip-

pery elm, gums, etc.,) laxatives of olive or linseed oil, soft pure water at will, and mucilaginous and anodyne injections into the bladder (gum Arabic 1 drachm, opium 1 drachm, tepid water 1 pint). Blisters may be used in paralysis. In severe cases these may be preceded by fomentations. Finally, when the acute symptoms have subsided, small doses of stimulating diuretics (copaiva, subeba, juniper, huchu,) will often serve to tone up the mucous membrane.

INFLAMMATION OF THE URETHRA.—GONORRHOEA.—GLEET.—*Causes.*—Like cystitis, this may depend on irritants in the urine, taken by the mouth or applied to the surface, excessive copulation, connection with a newly-delivered female or one that has otherwise contracted a vaginal discharge, mechanical injury to the penis in serving females, irritation from the passage or arrest of small stones or gravel.

Symptoms.—Swelling and soreness in the sheath and penis, pains in urinating, the liquid coming in jets and frequently arrested because of the suffering. In dogs there is continual licking of the organ, and soon a creamy pus drops from the orifice.

Treatment.—If before the discharge of pus, give a laxative and foment the parts with warm water. Wash out any gravel. If after suppurations, use soothing or astringent injections (permanganate of potassa, acetate of lead, sulphate of zinc or nitrate of silver, 2 grs. to 1 oz. water). Tonics and stimulating diuretics may be finally needed as in cystitis. A soft restricted diet is demanded.

STRICTURE OF THE URETHRA.—Usually a result of local irritation :—gravel, strong astringent injections used in the early stage of gonorrhœa or the healing of ulcers formed when that disease is neglected.

Symptoms.—Great difficulty in urination, the liquid escaping in a fine stream and with pain. Frequent painful erections.

Treatment.—Passing, daily, catheters of gradually increasing sizes, beginning with one just large enough to enter with gentle force.

EVERSION OF THE BLADDER can occur only in the female, from severe straining in irritation of the urinary organs, and especially after the organ has been rendered torpid or paralyzed by over-distension, severe parturition or otherwise. The animal strains violently and a red, tumid, rounded mass appears from between the lips of the vulva. On examining its surface near the neck the two orifices of the ureters may be detected with the urine oozing from them in drops.

Treatment.—Wash with milk-warm water containing laudanum, and return, pressing the centre of the mass inward so as to correct the eversion. The main difficulty will be met in returning it through the contracted neck of the bladder, and if the eversion has lasted long enough to determine inflammation and softening, great care will be requisite to avoid tearing the coats. Should straining be so violent as to threaten renewal of the eversion, a truss may be applied as advised for eversion of the womb.

URINARY CALCULI AND GRAVEL.—STONE.—These vary in chemical composition with the genus of animal, and especially with the nature of the food. In herbivora the urine normally contains a large amount of the carbonates of lime and magnesia and of oxalate of lime, a small quantity of silica, sulphate and phosphate of lime, ammonia-magnesian phosphate, hippuric acid and sometimes uric acid, besides the more soluble alkaline salts. Carnivora, on the other hand, have an excess of phosphate of lime and magnesia, of sulphates and chlorides, more uric acid than the vegetable feeders but a minimum amount of carbonate and oxalate of lime and silica. The omnivora occupy an intermediate position, the salts of the urine varying with the frequent changes in the food.

The nature of the food determines the excess of particular salts in the urine and their precipitation in the form of crystals.

These *carbonates of lime and magnesia*, which make up the bulk of most urinary calculi in horses and ruminants, are due to the large amount of vegetable acids (citric, tartaric, malic, acetic, etc.) in plants. These be-

coming further oxidized are transformed into carbonic acid, which unites with the magnesia or lime present in the blood.

Oxalate of lime is due to imperfect oxidation of the vegetable acids, oxalic acid containing an equivalent less of oxygen than carbonic acid. It appears in excess in certain diseases of the lungs or other conditions which interfere with respiration.

Silica enters the system as silicate of potassa in food and water, and especially in cyperaceæ, horse-tails, oat-straw, oat meal, etc. It is displaced as silica whenever it comes in contact with a stronger acid.

Phosphates enter the system in bran, in beans, peas, and in leguminous plants generally, in oil-cake and rape-cake, or (the carnivora) in the flesh and bones. When present in undue amount in a given quantity of urine they tend to crystallize out, but when a large amount of phosphate of magnesia is present, it is only necessary that the urine should be retained longer than usual in the bladder and that decomposition should set in with evolution of ammonia, to have the insoluble ammonia-magnesian phosphate at once thrown down.

Sulphate of lime is derived from sulphates in the water or the oxidation of sulphur contained in the albuminoid principles of food.

Urea, Uric Acid, Hippuric Acid, Creatine, Creatinine, Kiestine, Leucin, Tyrosin, etc., are all nitrogenous elements, derived from the waste of muscle and gelatinous tissues, or from albuminoid matter in the food. Urea is to be looked upon as the healthy product of such decomposition, while uric and hippuric acids, etc., are products in which the process of oxidation has stopped short, leaving the products in a less soluble condition and more liable to crystallize out of the urine. Impaired breathing from diseased lungs or otherwise, and imperfect action of the liver, whether from local disease in that organ or from feverish states, with impaired functions generally, are therefore among the causes which strongly predispose to urinary calculi.

Besides these, a certain amount of *mucous, fat, coloring matter* and even *blood* enter into the formation of urinary calculi.

Accessory Causes.—To the above named causes favoring the formation of urinary calculi, may be added all such as favor concentration of the urine. Thus, scarcity of drinking water, excessive loss of liquid by the bowels or skin (diarrhoea, dysentery, etc.,) dry winter feeding on hay and grain, feverish states in which little urine is secreted, and hard waters appear to have this effect. The last named cause is not generally credited by physicians, but its coincidence with the prevalence of stone is exceedingly common.

Mode of Formation.—The first requisite is that some solid body should exist as a nucleus around which layer after layer is crystallized, and hence the stone is always composed of a series of concentric layers. The nucleus may consist in a particle of mucous, fibrine or blood, a crystal deposited from over-saturated urine, or even a foreign body introduced from without. I have seen a large calculus in the kidney of a deer formed around a piece of wood, which must have penetrated the kidney and broken off, while the wound by which it entered had healed up.

Appearance.—Calculi vary much in character, but the most marked varieties are the smooth stones formed by carbonates, oxalates, phosphates and silica, and the rough, jagged crystalline specimens of ammonia-magnesian phosphates.

Renal Calculi.—Those found in the kidney are usually moulded in the pelvis, though I have found many like small lentils in dilatations of the microscopic tubes in the substance of the gland. Cattle fed on dry hay and grain during winter, rarely want small, yellow crystalline masses in the pelvis. Even when so large as to distend the pelvis and weigh several ounces, they are not always incompatible with good health and aptitude to fatten. When so large or rough as to produce manifest disorder, this appears as irritation of the kidneys, tender loins, stiff, straddling gait, etc., with the passage of microscopic

crystals, and perhaps blood or pus in the urine. In cattle and sheep the salts from the concentrated urine usually crystallize out on the hairs around the opening of the sheath. All species of domestic quadrupeds suffer.

There is no satisfactory *treatment*, and the great object is to prevent their formation by the measures named below.

Uretral Calculi.—These are lodged in the small canals which convey the urine from the kidneys to the bladder. They are usually formed in the pelvis of the kidney, and being washed on with the urine are arrested in the ureter. The symptoms are more violent than those of renal calculi, since the flow of the urine is checked and the ureter and pelvis of the kidney are over-distended, while the kidney itself undergoes inflammation, and, if the animal survives, is finally removed by absorption, the opposite kidney meanwhile enlarging and doing the work of two. The colics and general symptoms are like those of nephritis. The elastic distended ureter may sometimes be felt with the oiled hand introduced through the rectum. Like renal calculus, this is usually irremediable. Antispasmodics will sometimes succeed by relaxing the duct and allowing the accumulated urine to pass the obstruction onward. They are best given by injection into the bowel. If nephritis sets in the treatment must correspond.

Cystic Calculus.—*Stone in the Bladder.*—Seen in all domestic animals.

Symptoms.—Frequent straining to pass urine, which escapes in dribblets, in jets checked by a sudden arrest, or not at all. Blood in clots, and microscopic crystals or calculi usually pass with the urine. Examination with the oiled hand in the rectum will detect the rounded mass in the bladder, especially if it is partially filled with water. In the female it may be struck by a smooth metallic sound, or even touched with the finger.

Treatment.—By breaking the stone into small pieces, which may pass with the urine (*lithotrity*), or by extraction whole after dilatation or cutting of the passages (*lithotomy*). *Lithotrity* is effected with the lithotrite of

the surgeon, and is only applicable to the female quadruped, in which extraction is usually easy and safe. A pair of long, round-bladed tongs, like a glove-stretcher, may be used to slowly dilate the neck of the bladder, after which the warmed and oiled forceps, the blades of which should be broad enough to cover the stone, are introduced, and the stone being seized is slowly withdrawn by gentle oscillating movements. The injection of a little warm water into an empty bladder will greatly facilitate the seizure of the stone. The *male* is operated on standing or thrown on his right side. A *catheter* is passed up the urethra to the point where it bends forward over the hip bones, and an incision about two inches long made down upon this in the median line. If the stone is small the forceps may now be introduced and the calculus withdrawn as in the female. If too large for this the passage must be dilated with a probe-pointed knife, guided by a grooved director or the index finger, the incision being carried obliquely between the point of the hip bone and the anus. The stone once removed the opening may be stitched up and treated like any ordinary wound. In the ox a catheter should be passed as a guide in cutting, as the thickness of the erectile tissue over the arch of the hip bone and the small size of the urethra render the operation far more difficult than in the horse.

Urethral Calculi.—Stone in the canal by which urine is discharged from the bladder. In horses these are found in the terminal end of the urethra and its papillæ on the glans penis. In the bull and ox in the S-shaped bend of the penis just above the scrotum, and in the ram in the same situation, or, more frequently, in the vermiform appendix at the point of the penis. In horses the straining is violent and constant; in cattle and sheep it is little marked, but the tail is slightly raised and the accelerator urinæ muscle is seen contracting just beneath the anus as in ordinary urination. Examination along the course of the urethra will detect one or more hard nodular enlargements at the S-shaped curves or elsewhere. If more than one are present, they may be made to grate on each other

Treatment.—If in the papilla or vermiform appendix, try to extract by manipulation. Should this fail, slit open the duct, or in the ram cut off the appendix. If higher up it must be cut down upon, through the skin, and extracted. In cattle it is desirable to first pull the penis backward or forward, so that the incision may clear the scrotum with its excess of areolar tissue and fat.

PREPUTIAL CALCULI.—STONES IN THE PREPUCE OR SHEATH.—In oxen and sheep urinary salts often crystallize out on the hairs, and may even block the passage somewhat. They may be easily removed by manipulation or with scissors. The accumulations of sebaceous matter, in the bilocular cavity or on the end of the penis or in the sheath of the horse, sometimes receive this name. They are best removed by thorough washing with soap and warm water, and the parts may then be lubricated with sweet oil.

SAND-LIKE DEPOSIT OR SOFT MAGMA IN THE BLADDER.—This is frequent in the horse, the spherical granules of carbonate of lime and magnesia remaining apart instead of becoming agglutinated into a stone. Its mildest form is shown in the passage of a white matter at the completion of the act of urination. When accumulated so as to fill half of the bladder or more, this comes away in large amount and is found within the sheath and on the inner sides of the thighs, for the urine escapes involuntarily and continuously.

Treatment.—Wash out the bladder by pumping water through a catheter by means of Reed's stomach pump or a syringe, then shake it up with the hand introduced through the rectum, and allow the muddy liquid to flow out through the catheter. Repeat this until the bladder is emptied and the water comes away clear.

Prevention.—The next point is to prevent its forming anew by measures calculated to obviate urinary calculi in general. Correct any fault in feeding—excess of beans, peas, bran, etc.,—and any disorder in the liver functions. Give abundance of soft water, encouraging

its ingestion by a fair supply of salt, let the food be aqueous, consisting largely of roots, especially carrots, and give daily in the drinking water 1 dr. caustic soda or potassa, or common ashes from hard wood. A course of bitters should also be given (cascarilla, columba, willow bark, gentian, quassia, or others)



TURKISH HORSE

CHAPTER XII.

DISEASES OF THE ORGANS OF GENERATION.

General causes. Inflammation of the testicle. Dropsy of the scrotum. Hydrocele. Water stones. Tumors of the sheath. Disease of the penis. Ulcers of the penis. Castration of males. Evil results of castration. Strangulated cord. Swelling of the sheath. Phymosis. Paraphymosis. Tumor on the spermatic cord. Castration of females. Castration of male birds. Abortion. Difficult parturition. Premature labor pains. Induration of the neck of the womb. Twisting of the neck of the womb. Polypus in the vagina. Wrong presentations, deformities, etc. Maxims for assisting in difficult parturition. Anterior presentation with head or fore limb turned back. Posterior presentation with one or both hind limbs turned back. With water in the head or abdomen. Disorders following parturition. Flooding. Retained afterbirth. Leucorrhœa, catarrh of the womb or vagina. Eversion of the womb or vagina. Inflammation of the womb, Metritis. Parturition fever, milk fever, parturient apoplexy.

Are mostly confined to breeding and dairying districts. They are largely obviated by castration and the virgin condition. Amongst the principal causes may be mentioned mechanical injuries, excitement and irritation accompanying coition, gestation, parturition, over-officious or ill-directed assistance in delivery, a very rich or poor diet, tuberculosis, poisons, (ergot, savin, rue, cantharides, etc.) sympathetic irritation from excessive milking, from disease or injury of the mammary glands, of the urinary organs or of the rectum.

INFLAMMATION OF THE TESTICLE occurs mainly from external injury, though it may be roused by excessive copulation, or by glanderous deposit or other diseased process in the organ. The animal moves stiffly and with a straddling gait, and the testicle is enlarged, tender and frequently drawn up and dropped down again. It is to be treated with a dose of purgative medicine, restricted

soft diet, fomentations with warm water, and smearing of the bag in the intervals with extract of belladonna, laudanum or some other anodyne. Should fluctuation announce the formation of pus, make an opening with a sharp knife to evacuate it, while if destruction of the gland is threatened castration must be performed.

HYDROCELE—DROPSY OF THE SCROTUM.—Usually associated with water in the abdomen. Distinguished from scrotal hernia by not passing back with a sudden movement, but with a steady current and gradual diminution. The same treatment is needed as in ascites.

WATER STONES.—In geldings a considerable accumulation of water often takes place in multilocular cavities connected with the still pervious inguinal canal, which may be emptied by compression, the water returning to the abdomen with a continued thrill. They often disappear in winter to reappear the following summer. Though not injurious they may be removed by cutting down on the cavities and dissecting out the sacs.

TUMORS OF THE SHEATH.—These are easily removed by twisting them off. Some, however, bleed freely, and these should have a stout waxed twine tied firmly round their necks and be then twisted or allowed to drop off. If bleeding occurs after removal seize the bleeding orifice with forceps and tie with a waxed thread.

DISEASE OF THE PENIS.—Small warty growths may be cut off with scissors or knife and the part cauterized with lunar caustic. The soft condylomatous growths which occur in dogs may be treated in the same way. But when the large cauliflower-like masses are associated with hardening of the whole end of the organ, it must be amputated behind the indurated portion. The subject should be prepared by laxative diet, and, having been thrown, the yard is withdrawn, washed, and cut through gradually, beginning at its upper part and tying the arteries as they are reached. On reaching the

urethra at the lower part of the yard it is to be dissected out, and cut across so as to leave it three-quarters of an inch longer than the rest. Considerable bleeding from the venus cavities may come on a few hours later, and especially in hot weather, but may be easily controlled by dashing cold water between the thighs or stuffing the sheath with tow saturated with tincture of matico or muriate of iron.

ULCERS OF THE PENIS.—These may arise from accumulation of sebaceous matter but more frequently from the irritant discharges in a female recently delivered or suffering from leucorrhœa. They may be treated with a lotion such as the following:—Sugar of lead, 1 dr.; carbolic acid, 60 drops; chloralhydrate, 1 dr.; water, 1 pint.

CASTRATION OF MALES.—Numerous modes of castrating the male are followed, but in all the essential points are the removal or destruction of the testicles and the prevention of bleeding from the spermatic artery which is always found in the anterior portion of the cord. In small animals (pigs, lambs, calves, dogs, cats,) the testicle is seized so as to render the skin tense, and a free incision with knife parallel to the median line sets it free at once. The knife is now passed between the middle and posterior parts of the cord and the latter cut through. The anterior portion is then twisted and finally torn through, the upper part being held by the finger and thumb of one hand while traction is made by the other. In the colt and old horses and bulls the structures are so tough that the cord must be seized by two pairs of pincers in order to accomplish satisfactory twisting.

Clamps (sticks) are very generally employed in horses, the important considerations being that the wood shall be tough and unyielding, that they shall be grooved to give greater security of hold, that they shall be tied together with well twined inelastic cords, and that when applied they shall be squeezed together with pincers while the

end is being tied, that the included tissues may have their vitality destroyed.

The other methods of tying, searing and scraping the artery, etc., cannot be described here, though one plan will succeed as well as another, if properly done. For these and castration of *cryptorchids* (originals, rigs,) see larger work.

EVIL RESULTS OF CASTRATION.—STRANGULATED CORD.—When the cord is left unduly long and the wound in the skin small, it may be strangled by the swelling and contraction, giving rise to intense suffering and high fever. The beast walks with a stiff gait, and the end of the cord is felt red and tense, protruding from the wound which grasps it tightly. All that is necessary is to enlarge the orifice with a knife and push up the cord to give permanent relief.

SWELLING OF THE SHEATH may occur, and especially in the young, from unhealthy states of the system, or from premature closure of the wound and imprisonment of matter. In all such cases reopen the wound with the fingers and apply fresh lard to prevent a second adhesion. It is a good plan to apply lard to all wounds in castrating to obviate adhesion. Next foment the parts continually with warm water to hasten the formation of matter. When a free cream-like discharge is established the swelling will rapidly subside.

PHYMOSIS AND PARAPHYMOSIS.—In such cases the penis may be imprisoned within the sheath or protruded and swollen so that it cannot be withdrawn. It may be necessary to incise the sheath or scarify the penis and apply cold water and other astringents, with manipulation to return the protruded organ.

TUMORS ON THE SPERMATIC CORD.—This results from rough handling in castrating, from strangulation, or from inflammation consequent on the presence of irritants in the wound or exposure to cold. It may grow for years without disabling the animal; its growth may cease, leaving an inconsiderable thickening on the cord; it may acquire the size of a large udder of a cow, and contract

numerous vascular adhesions to surrounding parts ; or it may extend up through the inguinal canal into the abdomen, as felt on examination through the rectum.

Treatment.—Those confined to the end of the cord may be removed like the testicle in castration. Those that have contracted adhesions to the thigh and sheath may still be removed with care, each vessel being tied as it is reached. But when the adhesions are very extensive and the tumor very large it is almost impossible to do this, and in the case of extension of the disease into the abdomen nothing can be done beyond partial destruction of the mass with caustics.

CASTRATION OF FEMALES.—In small animals this is done through the flank ; in large, more conveniently through the vagina. The animal is stretched on its left side, the fore limbs and head being firmly secured and the hind limbs extended backwards. The hair is shaved from the flank a little below the angle of the hip bone, and an incision made from above down, extending to an inch in the pig or bitch, or sufficient to introduce the hand in the heifer. Then with the finger or hand, as the case may be, the womb is sought, backward at the entrance of the pelvis in the interval between the bladder and the straight gut. Being found, one horn or division is drawn up through the wound until its end is exposed with the round mass of the ovary adjacent. The latter is seized and cut or twisted off, according to the size of the animal. Then the next horn and ovary are brought out and treated in the same way. The womb is now returned to the abdomen, and the skin accurately sewed up. Evil results are rare, though peritonitis may ensue from rough handling or exposure, and abscess or calcification of the wound is not unknown.

Cows are castrated by making an incision through the superior wall of the vagina, just above the neck of the womb, and inserting two fingers, by which the ovaries are withdrawn and twisted off with a torsion instrument. Space will not allow of a fuller description in this work.

CASTRATION OF MALE BIRDS.—The bird is placed on its back with the left leg pressed against the abdomen and the right one stretched backward and outward, an incision is made inside this thigh large enough to admit the finger, which is directed towards the back at the point of union of the last ribs with the backbone. There the testicles are felt in contact with each other, and are separately detached with the nail and extracted through the wound. If lost in the abdomen after detachment there is no matter, they will adhere to the peritoneum and become absorbed. Lastly, the wound in the skin is carefully sewed up with a fine thread.

ABORTION.—This consists of the expulsion of the foetus before it can live out of the womb, but in the lower animals the term has been indiscriminately used for cases of premature parturition as well.

Causes.—Blows or pressure on the abdomen, slips, falls, riding of animals in heat, diseases of the abdominal organs, (tyimpanitis from wet, frosted or musty fodder, inflammation of the bowels, diarrhoea, poisoning with irritants taken with the food or otherwise, renal calculi, or other diseases of the kidneys or bladder,) stalls too much inclined backward, overfeeding, plethora, hot, damp, relaxing stables, severe muscular exertion after long rest, exhausting feeding for milk at the expense of the system, breeding at too early an age, proximity to or contact with slaughter-houses or dead and decomposing animal matter, especially the abortion discharges of other animals, drinking putrid or iced water, disease, deformity or death of the foetus, feeding on ergoted grasses or smutty wheat or corn, and, finally, the presence in the passage of a microscopic vegetable parasite, which is easily transferred from one animal to another so as to procure abortion.

Symptoms.—In the early stages of gestation abortion often takes place without any warning, and is only ascertained by the animal again coming in heat. Later the preliminary signs and progress may be those of an ordinary parturition, or in other cases a whitish muco-puru-

lent discharge may take place from the vulva for some time before abortion occurs. A filling of the udder and a loose flaccid condition of the external generative organs often furnish premonitions.

Prevention—Treatment.—Avoid the various causes above named when found to exist. Especially should attention be given to secure a diet and regimen which shall obviate indigestion, to eradicate from the hay-fields all irritant plants, to feed a certain amount of roots in winter to obviate urinary calculi, to cut meadows subject to ergot before they run to seed, or better till to plough them up and put under a rotation of other crops, to feed roots with ergoted hay or smutty corn if these must be consumed, to let the system be somewhat developed before breeding and not to milk too heavily the first year, to give pure air and water and wholesome buildings, and, finally to use anti-septics on the discharges, and to keep all sound animals apart from the diseased or their products. A beast aborting from whatever cause should be allowed to run over several periods of heat before she is served again. When abortions have broken out in a herd good results have followed a course of chlorate of potassa in $\frac{1}{2}$ oz. doses daily. When the beasts are plethoric benefit has been derived from bleeding or a bare diet with occasional mild laxatives. When run down by poor feeding or by early breeding and feeding for milk, a course of tonics (phosphate of soda, sulphate of iron, gentian and ginger,) has proved beneficial. When the discharge and other premonitory symptoms appear, laudanum may be given in large and repeated doses to quiet the system and keep the tendency in check. Quiet and seclusion are no less essential. When the abortion becomes inevitable it must be allowed to proceed, or assistance given if necessary as in parturition.

DIFFICULT PARTURITION.—Parturition is easy in most of the lower animals, the wedge-like outline of the foetus when normally presented with the long head extended between the fore limbs rendering it an affair of mechanical simplicity. The same is true of the presen-

tation of the two hind feet. If left to nature the passages are prepared by the relaxation of the ligaments of the pelvis and falling in on each side of the croup; they are then gently and equably dilated by the advancing soft and elastic water-bags; and then if the back of the foetus is turned toward the back of the mother so that the curvature of the body may correspond to that of the pelvis, the process is rarely difficult or protracted.

Danger arises mainly from parturition being precipitated before its natural period, from unnatural conditions of the passages, from distortions of the foetus, or from turning back of one or more members so as to impair the regularity of the wedge and to increase the bulk posteriorly.

PREMATURE LABOR-PAINS.—Caused by excitement of travel, goring or riding by their fellows, blows and other mechanical injuries, violent purgation or diuresis, diseases of the digestive or urinary organs or womb, ergoted grasses, etc. If there is no relaxation of the pelvic ligaments and falling in at the side of the rump, no enlargement of the vulva, no dilatation of the neck of the womb nor enlargement of the bag, place in a secluded place and keep quiet by repeated doses of opium. The pains will usually subside. Even if otherwise apparently prepared, the closed neck of the womb will demand similar rest and anodynes, though a little solid extract of belladonna may in this case be smeared round the neck of the womb to favor relaxation.

Induration of the neck of the womb is often erroneously supposed to exist in these cases, but such a conclusion need not be reached until the quieting treatment has been followed for one or two days without success and the neck of the womb remains rigid, nodular and gristly. Being fully convinced that the closure is due to disease, it may be dilated by passing in a narrow-bladed, blunt-pointed (probe-pointed) knife and cutting to the depth of a quarter of an inch in four directions, upward, downward, to the right and left. Then the hand may be introduced, with fingers and thumb drawn into the form of a

cone, and the passage gradually dilated. Or the sponge tents used by the physician may be employed.

Twisting of the neck of the womb, so that the lower surface of the organ comes to look upward or to one side, is a curious form of obstruction hitherto only seen in the cow. It may be surmised when labor-pains continue without any appearance of water-bags, and conclusive evidence is furnished by the neck of the womb being closed and thrown into spiral folds. Place the patient with its head uphill to relax the twisted neck, and introducing the hand into the womb seize the foetus and press it against the uterine walls, while one or two men roll the cow on its other side in the same direction in which the twist has taken place. If the womb is not distended by decomposition of a dead foetus, nor attached to adjacent parts by inflammatory exudations, the untwisting is easily effected, though several successive attempts may be requisite to secure it. Suddenly constriction around the wrist gives way, the water-bags enter the passage, and delivery is easy.

Polypus in the Vagina.—A tumor growing from the walls of this passage is another obstacle to parturition. By examination its point of attachment is found, and it should be slowly twisted off, or, better still, removed by an *acrasuer*, an instrument with a pitch-chain which is gradually tightened so as to cut through the parts without loss of blood.

WRONG PRESENTATIONS, DEFORMITIES, ETC.—*Maxims for assisting in Difficult Parturition*.—Never interfere too soon. Let the water-bags burst spontaneously when they have fulfilled their purpose of dilating the passages. If there is no mechanical obstacle, let the foetus be expelled by the unaided efforts of the mother. Never insert the arm for any purpose without first smearing it with oil or fresh lard. When the water-bags have ruptured and the pains have continued for some time without any presentation, examine. When one fore foot only and the head, or both fore feet without the head, or the head without the feet, or one hind foot without the

other appears, examine. Whatever part is presented should be secured by a cord, with a running noose, before it is pushed back to search for the others. In searching for a missing member the dam should be placed with her head down hill, and if recumbent should be laid on the side opposite to that on which the limb is missing. Even if the missing member is reached do not attempt to bring it up during a pain. Violent straining may be checked by pinching the back. If the passages have lost their natural lubricating mucus, smear them and the body of the foetus thickly with lard before attempting to extract. In dragging upon the foetus apply force only when the mother strains, and pull slightly down toward the hocks as well as backward. If under the necessity of cutting off a limb, first skin it from near the foot and leave the skin attached to the trunk. Never cut off a member in the middle, but in the case of fore limb bring away the shoulder-blade, or in the hind the thigh-bone.

Head or fore limb turned back.—Secure the presenting limbs with ropes having a running noose drawn tightly round the fetlock, or the head with a noose round the lower jaw, or still better round the neck behind the ears, then pushing them back secure the missing part and bring it into position. In searching for the missing parts it is well to follow those already presented. The left arm will usually answer best for a limb at the left side of the womb, and the right arm for the right. Reaching the shoulder, the hand may be slid down to beneath the elbow, and that joint bent so as to bring the knee up; then the hand is slipped past the knee to the shank and by a similar movement, pushing back the upper part of the limb and pulling forward the lower, the foot is brought up and secured with a noose. All are then brought forward and delivery is easy. In order to bring up the missing part it is often needful that an assistant shall push back the body of the foetus after the limb has been seized. The assistant may stand with his back to that of the operator and introduce his left arm along by the operator's right or *vice versa*. Or a smooth

round pole like that of a fork-handle may be introduced and planted in the breast of the foetus as a means of pushing it back. In either case the pressure should be slightly upward toward the back of the foetus so as to bring up the breast and fore limb toward the passage. The *missing head* may be turned back on either side, downward upon the breast or upward upon the back. First ascertain its position, then if it cannot be reached by pulling the limbs forward into the passage, push back the body in such a way as will favor the advance of the head. If the ear is reached the head may be pulled by it, till the socket of the eye can be gained, and the body being still pushed back the nose can soon be seized and brought up. Often it is necessary to insert a hook into the eye socket or between the branches of the lower jaw, so that more force may be exerted. The ring in this case should be turned at right angles to the hook, and a cord passed from the hook side of the ring, to the opposite, and then knotted so that the greater the force applied the firmer it will hold.

Presentation of one hind limb alone is recognized by examining it as far up as the hock, which cannot possibly be mistaken for the knee. The same principles are applied here. Noose the presenting limb, and pushing back upon it and the buttocks, bring up first the hock and then the foot, bending all the joints to their utmost. In the cow, success can usually be counted on, but the long hind shanks of the foal often prove an insuperable obstacle, and it becomes needful to cut the hamstrings and, leaving the hock bent, to straighten out the limb above this and extract in this position.

Presentation of the buttocks is to be recognized by the rounded mass, with the tail and beneath it the anus and perhaps the vulva. The process of extraction does not differ from that last described, but in very powerful mares the pains may be so violent and constant that it is impossible to bring up even the hocks, and the limbs have to be separated at the hip-joint and extracted separately, after which the trunk will come easily.

Double heads and bodies and superfluous limbs have to be removed on the same general principles, but space forbids their further notice here.

Water in the head is often an insuperable barrier to delivery, to be easily recognized by manual examination, and as readily relieved by plunging a knife through the membranes and evacuating the liquid.

Water in the abdomen is equally frequent and to be obviated in a similar manner.

DISORDERS FOLLOWING PARTURITION—FLOODING.

—Bleeding from the walls of the womb. Mostly after a too hasty parturition in which the uterine walls are exhausted and fail to contract; or when the womb has suffered violence in extraction of the foetus.

Symptoms.—Bloodless pallor of the mucous membranes, coldness of the surface, weakness, weak pulse, with or without palpitation of the heart and discharge of blood from the vulva. The hand introduced into the womb finds that organ soft, flaccid, dilated and filled with liquid or clotted blood.

Treatment.—Apply cold water or bags of ice to the loins and external genital organs, remove the afterbirth and clots with the hand and, if necessary, inject cold water, acids (vinegar, dilute mineral acids,) astringents (sugar of lead, tannin, matricaria, alum,) into the womb, and give small doses of acetate of lead or ergot of rye by the mouth. In desperate cases a large sponge soaked in tincture of the muriate of iron may be introduced into the womb and emptied by squeezing. If the patient is sinking it may often be saved by transfusion of blood from another animal.

Retained Afterbirth—Causes.—Premature parturition, poverty of condition, too hurried delivery and failure to establish subsequent contractions, adhesions, the result of pre-existing inflammation in the womb, etc.

If not removed it rots away piecemeal, a portion remaining and putrefying in the womb, causing irritation, discharge, rapid loss of condition and milk and in some cases absorption of putrid matter and poisoning.

Treatment.—Various methods are followed. 1. Attach a pound weight to the mass, so that the constant tugging may stimulate the womb to contraction and expulsion of the afterbirth. 2. Seize the mass close up to the vulva between two pieces of wood and dragging gently move it from side to side to titillate the passages and stimulate the womb to contraction. 3. Give a dose of physic (Glauber or Epsom salts) with aromatics (ginger, pepper, copaiva, cardamoms, caraway, etc.) 4. The most satisfactory method is to remove it by the hand, in twelve to twenty-four hours after parturition, before the neck of the womb has closed so as to forbid the introduction of the arm. In cows the protruding membranes are gently pulled upon by the left hand while the right is introduced into the womb and the connecting cotyledons or placentulæ of the membranes are, one by one, squeezed out from their connections with those of the womb. The process may be slow, as fifty such connections may demand separation, but patience will be crowned with final success, the great points being to tear nothing and to bring up and separate the last portions as perfectly as the first.

Prevention.—In poverty-stricken animals much may often be done by warm sloppy food for a week or two prior to parturition.

Leucorrhœa—Catarrh of the womb or Vagina.—This often results from retained afterbirth or violence done in parturition, but may occur independently of both or even in the virgin animal. There is a whitish discharge from the vulva, foetid if from retained afterbirth, with rapid falling off in flesh and milk, in spirit and appetite. The subjects can rarely be impregnated.

Treatment.—Introduce a catheter into the womb, draw off the contained fluid, wash out with tepid water introduce through the tube, and inject one of the following solutions:—one drachm of sulphate of zinc, sulphate of copper, acetate of lead, permanganate of potassa or carbolic acid, or half a drachm chloride of zinc, dissolved in a pint of water, and five ounces of glycerine added. This injection should be repeated daily until the dis-

charge ceases. A course of tonics should accompany this treatment—sulphate of iron, two drachms; pepper, one drachm; ginger, half ounce; gentian, half ounce, daily.

EVERSION OF THE VAGINA OR WOMB.—The former may occur before parturition or even in the virgin state, the latter only after parturition. Hot, relaxing stables and regimen and too great a slope of the stalls backward are among the causes of the first, violence in parturition or in the removal of the afterbirth, of the second. Digestive and urinary disorders are further causes. The everted vagina forms a simple rounded mass, easily distinguished from the bladder by the absence of the ureters, and from the womb by that of the two divisions or horns, and in the case of ruminants, by the cotyledons. *Treatment is simple:* Adjust the slope of the stall, making the hinder part the higher; obviate costiveness, diarrhoea or any other source of irritation; and adjust a rope truss as follows: Take two ropes, each more than double the length of the animal, bend each double and intertwist them at this bend so as to circumscribe an oval opening a little larger than that of the vulva; this having been adjusted to this orifice the two upper ends are carried around the rump, crossed over each other repeatedly in their passage along the back, and finally tied to a collar previously placed around the neck; the lower ends are carried down between the thighs, one on each side of the udder, and forward on the sides of the abdomen and chest to be fixed to the collar. It may be made as tight as seems necessary, and will tighten at every effort at straining, so that eversion becomes impossible. It may be made more secure by attaching the ropes to a surcingle as well. This truss must of course be removed when true labor-pains come on.

INFLAMMATION OF THE WOMB.—*Causes.*—Lacerations, bruises and other injuries in parturition or in removal of the afterbirth, exposure to cold or wet after parturition, retained afterbirth, etc.

Symptoms.—Two or three days after parturition a shivering fit, colicky pains, looking at abdomen, plaintive cries, twisting of the tail, lifting of the hind feet, tenderness of loins and abdomen, arching of the loins, vulva red and swollen, frequent straining with foetid discharge, the hand introduced into the womb finds both its neck and body dilated with fluid contents, the belly becomes tense and swollen, there is grinding of the teeth, insatiable thirst and loss of power over the limbs. The pulse and respiration are accelerated and the temperature of the body raised. It may end in poisoning of the blood with pus or absorbed putrid matter, or in gangrene, or if recovery ensues it may be perfected in two or three weeks. Peritonitis and enteritis frequently co-exist, and are equally fatal at this period.

Treatment.—Wash out the womb, as in leucorrhœa, with chlorine water or a solution of chloride of lime, permanganate of potassa or carbolic acid, adding a solution of gum Arabic, glycerine and laudanum, to render it more soothing. Give an active purgative (in the cow, sulphate of soda 1 lb.) and follow this up by tincture of aconite four times a day, and nitrate of potassa and chlorate of potassa once daily. A blister should be applied to the right flank (mustard and oil of turpentine in cow or sow, mustard alone for other animals). In case of prostration, weak pulse, stupor, etc., a free use of wine, quinine, camphor and general stimulants must be made, with antiseptics (chlorate of potassa, carbolic acid, sulphocarbolates or bichromate of potassa).

PARTURITION FEVER IN COWS.—MILK FEVER.—PARTURIENT APOPLEXY. — *Causes.*—Plethora, costiveness and the susceptibility attendant on parturition. It attacks mainly heavy milkers, animals in full flesh that have been well fed just before and after calving, and have been delivered easily with little loss of blood or nervous expenditure. It is most frequent in the hot season, when the grass is most luxuriant and nutritive, but may occur at any season in the best class of cows.

Symptoms.—Dulness, languor, uneasy movements of

the hind limbs, a full, bounding pulse, red eyes, hot head and horns; soon the cow becomes weak on its limbs, unable to rise, lays the head back on the flank or dashes it on the ground, breaking the horns if the surface is hard, and struggles convulsively with its limbs. The surface may now be bedewed with perspiration, the eyes red, fixed or rolling convulsively, the pupils dilated, the heat of the head still greater and the pulse quicker and weaker. Sensation is completely lost, the skin may be pricked at any point without the slightest response, and the eyeball touched without causing winking. Neither dung nor urine is passed, the intestines and bladder being also the seat of paralysis or torpor.

In one form of the disease the heat of the head, delirium and violence may be almost entirely wanting, the prominent symptoms being the fever, accelerated pulse and breathing, elevated temperature, loss of power over the limbs, paralysis of sensation, inappetence, torpor of bowels and bladder. Both forms are exceedingly fatal, almost all attacked within two days after calving perishing, and a large proportion of those taken ill during the first week.

Prevention.—Spare diet (starvation in the plethoric) for a week before and after calving, an active purgative (Epsom salts) to act as soon after calving as possible, plenty of fresh, cool air, milking, if necessary, before calving and thrice daily after. In the full flush of grass it is needful to keep plethoric parturient subject in-doors, upon dry hay with plenty of salt and water, or on a very bare pasture. Even if attacked a week after calving they usually recover.

Treatment.—If the animal is seen before it goes down, bleed four or six quarts from the jugular, but never after the pulse has lost its fulness or hardness; apply ice-cold water, bags of ice or a solution of an ounce each of nitre and sal ammoniac in a quart of water to the head, round the base of the horns; give a powerful purgative, (2 lbs. Epsom salts, $\frac{1}{2}$ oz. carbonate of ammonia, $\frac{1}{2}$ dr. nux vomica,) apply friction to the limbs, draw the milk off at frequent intervals and repeat the ammonia and

nux vomica every four hours. The nux vomica may be replaced by strychnia, 1 grain with 2 or 3 drops of vinegar in a teaspoonful of water, and injected under the skin twice with four hours interval, or ergot of rye may be used instead. The fever may often be materially reduced by enveloping the whole body in a sheet wrung out of cold water, and covered up with one or several dry ones, according to the season.

In the second or torpid form of the disorder there is often no call for cold applications to the head, while purgatives and nux vomica are especially demanded.



CHAPTER XIII.

DISEASES OF THE MAMMÆ (UDDER) AND TEATS.

Bloody-milk. Blue or viscid milk. Congestion and inflammation of the mammary glands, Garget, Mammitis. Impervious teat. Sore teats, Scabs, Warts. Simple and cancerous tumors of the glands.

BLOODY-MILK. — *Causes.* — Blows on the udder, or commencing inflammation from any other cause; heat or rut; a sudden accession of rich food, causing local congestion with increased flow of milk; the consumption of acrid plants (ranunculus, hydropiper, resinous shoots, etc.,) and the conditions which give rise to red-water. The milk may have a red sediment from feeding madder, logwood and other agents.

Treatment. — If from congested glands, a saline laxative, followed by nitre, restricted diet and bathing with cold water. If from acrid plants, withhold them, give a laxative to clear away any yet retained in the stomach, and follow up with small doses of nitre and acetate of lead. If from partial congestion, with a somewhat nodular state of the gland and but little heat or tenderness, rub daily with compound tincture of iodine mixed with three times its bulk of water. Milk carefully and gently.

BLUE OR VISCID MILK. — Due to cryptogams in this liquid. Remove from the vicinity of decomposing animal matter, withhold food or water containing vegetable germs, and administer daily bisulphite of soda (2 grs., cow).

CONGESTION AND INFLAMMATION OF THE MAMMARY GLANDS—GARGET—MAMMITIS. — *Causes.* — Blows on the gland, lying on a cold or sharp stone, sores on the teats, leaving the milk unduly long in the bag (hefting),

standing in a current of cold air, exposure in cold showers or inclement weather, rich milk-making food too suddenly supplied, indigestion, or indeed any derangement of the general health is liable to produce this disease in an animal in full milk. Ewes often lose their bags or their lives from sudden weaning of their lambs, or cows from neglect in milking. Some aliments, like cotton seeds, are dangerous.

Symptoms.—There may be simple warm, hot, tense (caked) bag, or there may be a circumscribed nodular mass in the centre of the bag. In severer cases there is lameness on the affected side, a red, hot, tense painful gland, with no secretion or only a bloody clotted mass. These cases come on with violent shivering, high temperature, strong rapid pulse and quickened breathing, dry nose, costiveness and suppression of urine. They may end in abscess, induration or gangrene, or a perfect recovery may ensue.

Treatment.—In mild cases with no fever and little pain, rub well with camphorated spirits or weak iodine ointment, or *with plenty of elbow-grease*. Milk thrice a day and rub for a considerable time on each occasion. If unequal to active rubbing put a good hungry calf to the udder.

In the severe cases, if seen in the shivering fit, give a strong cordial (ginger, pepper, whisky, brandy, gin or ale in several quarts of warm water) and envelope from head to tail in a thick rug wrung out of water as nearly boiling as possible, covering all with several dry blankets and binding firmly to the body; give copious warm water injections and bring if possible into a sweat. When this has lasted half an hour uncover gradually, rub dry and cover with a light dry wrapping.

If the disease has advanced further and there is already active inflammation in the gland, foment continuously with warm water or support in a poultice, cutting holes for the teats, adding a little belladonna to relieve the pain. Give an active purge (salts) and follow up with aconite and nitre. Draw off the milk frequently, using a milking tube if the act is very painful. If the

discharge smells sour inject a weak solution of carbonate of soda and permanganate of potassa (five grains of each to one ounce of water). If the gland becomes hard and indurated, rub with iodine ointment or mercurial ointment, not both. If matter forms, open with the knife. If gangrene ensues, use lotions or carbolic acid or chloride of lime. Many sheep do well with a coating of tar on the gland. In the advanced stages nourish well and give tonics (sulphate of iron, gentian, columba).

IMPERVIOUS TEAT.—From concretions from the milk, which are freely movable in the teat and up into the gland. From polypus in the teat hanging by a band from the mucous membrane and hence movable only in narrow limits. From thickening of the mucous membrane and contraction of the walls of the duct to absolute closure. From the formation of a membrane across the duct of the teat. From closure of the external orifice of the teat effected in the healing of a sore.

Treatment.—Concretions may be extracted by manipulation or with a grooved director, the teat having been first relaxed in a warm solution of belladonna. Polypi are removed by making a free incision through the teat, twisting off the tumor, accurately sewing up the wound, and milking for some time with a tube. The obliteration of the duct by contraction of its walls or by a membranous growth is to be met by a *bistouri cache* (a knife one line in breadth hidden in a groove of a sharp-pointed handle, but which can be pressed out of its case so as to cut to any extent desired) and a silver or gutta-percha teat tube to be kept tied in the newly made channel until it heals. It is well to leave these surgical operations until the milk is dried up. A simple instrument is in use by dairymen, consisting of a steel probe flattened out to two lines at one extremity and with finely sharpened point.

SORE TEATS—SCABS—WARTS.—Sores, chaps and scabs on the teats are to be treated by soothing applications. One ounce each of spermaceti and almond-oil

melted together will often suffice. Or five grains each of balsam of Tolu or Peru may be added. Or a solution of five grains of sugar of lead or chloral-hydrate, and half an ounce each of glycerine and water. But no plan will succeed without gentle milking, with dry teats, especially in winter, or in bad cases without the use of a milking tube. Warts are to be removed by the knife, scissors and caustic.

Simple and Malignant Tumors of the mammary glands are met with in all species of domestic quadrupeds and demand removal with the knife.



THE ARAB AND HIS STEED.

CHAPTER XIV.

DISEASES OF THE EYES.

Trichiasis. Torn eyelids. Superficial inflammation of the eye. Simple ophthalmia. Conjunctivitis. Parasites on the eye. Specks or films on the eye. Ulcers of the transparent cornea. Tumors of the transparent cornea. Enzootic ophthalmia in cattle and sheep. Internal ophthalmia. Inflammation of the deep structures of the eyeball. Iritis. Choroiditis. Retinitis. Recurring ophthalmia. Periodic ophthalmia. Moon-blindness. Cataract. Palsy of the nerve of sight. Amaurosis. Glass eyes. Glaucoma. Cancer. Staphyloma. Worms in the eye.

TRICHIASIS.—Turning in of the eyelashes ; a common cause of inflammation. Snip off the offending hair with scissors.

TORN EYELIDS should be accurately brought together and held by collodion, which is to be laid on with a brush, layer after layer, until strong enough to hold safely. If this is not at hand bring together with a quilled suture—the stitches, with carbolated thread or catgut, being tied round two quills lying on the respective flaps, so as to prevent puckering of the edges and to secure even healing. If the lips are brought into accurate apposition and stitches placed closely together, the quills may be discarded. To prevent rubbing of the healing and itching eye, turn the animal round in the stall and tie short to the two posts so that the head cannot reach either. Feed from a bag hung in front and cut open half way down to admit the nose.

SUPERFICIAL INFLAMMATION OF THE EYE.—SIMPLE OPHTHALMIA.—CONJUNCTIVITIS.—*Causes.*—Blows with whips, etc., hay-seed, chaff, dust, lime, thorns, etc., in the eye ; standing in a current of cold air ; irritant emanations from dung and urine ; obstruction of the lachrymal

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duct with swelling at the inner angle of the eye and hardened mucus in the orifice of the duct as seen in the floor of the chamber of the nose; in horse and ox, the presence of a worm—*filaria lachrymalis*—inside the eyelids; and in pigs of the measles bladder-worm—*cysticercus cellulosa*—in the fat around the eye.

Symptoms.—Red, sore, watery eyes, with or without fever according to the severity of the attack, soon followed by a bluish or white film or opacity extending no deeper than the surface of the transparent part of the eyeball. The swelling of the eyelids may extend to the hollow above the eye, filling it up. There is no suffering or winking when brought into a bright light, nor any undue contraction of the pupil as compared with healthy eyes. If foreign bodies are present they will be detected by examination.

Treatment.—Hay-seed, chaff, etc., may be removed with a pair of small forceps, with the point of a lead pencil, or with the head of a pin covered with a soft handkerchief. Lime and sand may be similarly removed or washed out with a fine syringe. Thorns may be picked out with a needle, the animal having been first thrown and the eye fixed with the fingers or by putting the patient under the influence of ether or chloroform. Or if not too deep they will slough out of their own accord in a day or two. The patient must be protected from cold or any other apparent cause of illness, should take a dose of physic, and have the affected eye covered with a cloth constantly wet with a solution of 1 dr. sugar of lead or sulphate of zinc, 10 grains morphia, and 1 pint water. It is often used tepid, but if used cold it should be maintained so.

WHITE SPECKS AND CLOUDINESS OF THE EYE.—These are the results of inflammation, and if confined to the transparent outer coat of the eye may usually be removed by touching them daily with a feather dipped in a solution of 3 grs. nitrate of silver in an ounce of distilled water. Such an application should never be made while the part is still inflamed and the eyelids swollen and red,

as it will then be painful and injurious. It will usually fail to remove the speck when that consists in a thick cicatrix following an ulcer, or when red vessels are seen running across it.

ULCERS OF THE TRANSPARENT CORNEA.—These also follow inflammation, and are to be recognized by the visible breaks or abrasions in the surface layers of the transparent coat of the eye. Apply the same agent as for specks, but of double or treble the strength, and improve the general health by a liberal diet and a course of tonics (sulphate of iron, nux vomica, cinchona).

TUMORS OF THE TRANSPARENT CORNEA.—These, if not of a cancerous nature, nor connected with the vascular colored curtain which encircles the pupil (the iris), may be removed with the knife or scissors, the part touched with a stick of nitrate of silver, and a lotion like that used for simple ophthalmia applied on a cloth.

ENZOOTIC OPHTHALMIA IN CATTLE AND SHEEP.—This affection attacks one or several herds or flocks in a locality, at any season and without apparent cause, except proximity. The symptoms are those of simple ophthalmia, but of a severe type, with much fever and complete clouding of the eye from exudation into the whole thickness of the transparent cornea, followed by ulceration, and sometimes perforation of this membrane, loss of the humors of the eye, and permanent blindness.

Treatment.—Separate the sound from the diseased and from the pastures or buildings where the malady has appeared. Give the affected strong purgatives (salts) followed by diuretics (nitre), place in a dark, quiet, dry building, and keep a cloth over the eye saturated with a solution of a drachm each of nitrate of silver and carbolic acid and 10 grs. of morphia to a quart of distilled water. Blisters may be applied to the cheeks or behind the ears (Spanish flies 2 drs., lard $\frac{3}{4}$ oz., for cattle; twice the amount of lard for sheep; rub well in). The resulting ulcers may be treated in the ordinary way.

INTERNAL OPHTHALMIA.—INFLAMMATION OF THE DEEP STRUCTURES OF THE EYEBALL.—IRITIS.—CHOROIDITIS.—RETINITIS.—*Causes.*—Severe blows or other forms of local irritation ; extremes of darkness and light ; exposure to a draught of cold air, to a storm ; various constitutional disturbances, especially those of the digestive organs.

Symptoms.—Like those of superficial ophthalmia, but with more fever, constitutional disturbance, accelerated pulse, loss of appetite, increased heat of body, and above all with retraction of the eye into its socket, protrusion of the haw from its inner angle over its surface, closure of the lids and contraction of the pupil when brought into the light, and the presence of a turbid liquid behind the transparent cornea, with white floating flakes, and a yellowish or whitish deposit at the bottom of the chamber. The brilliant reflection of the iris or curtain is also largely impaired. As the disease advances a white speck or cloud appears in the lens, behind the pupil and iris.

Treatment.—Place in a dark building with pure, dry air, purge (cow, salts ; horse, aloes ; dog, castor-oil,) and follow up with febrifuges (nitre, digitalis ; in dogs or pigs tartar emetic) ; apply alternately by means of a rag over the eye a lotion of 20 grs. acetate of lead, 20 drops extract of belladonna and 1 quart water, and one of 20 grains sulphate of zinc, 20 drops of tincture of (physostigma) Calabar bean, and 1 qt. water, changing twice daily ; blister the face or neck as for enzootic ophthalmia.

RECURRING OPHTHALMIA.—PERIODIC OPHTHALMIA.—MOON-BLINDNESS.—Attacks solipeds only.

Causes.—Hereditary predisposition ; breeding in damp, cloudy, foggy, or marshy localities ; keeping in damp, close, ill-conditioned stables ; the irritation about the head attendant on teething ; clogging the digestive organs by feeding wheat or maize without salt or sulphate of soda, the presence of worms in the intestines ; whatever lowers the general health, and the general causes of iritis.

Symptoms.—Like those of internal ophthalmia with, in

many cases, increased tension and hardness of the eyeball, and its deeper retraction into the orbit. The main difference is in the liability to recur, at intervals of three weeks, a month or more, if the exciting causes have not been removed, until the subject is left blind. In the intervals between the attacks the transparent coat of the eye retains a hazy bluish cloudiness around its border, the iris is wanting in its normal lustre, the anterior chamber has often a slight deposit at its lower part, and the upper eye-lid is bent at an unnatural angle about one-third of its length from the inner angle. After two or three attacks a cataract remains.

Prevention.—Avoid, for breeding purposes, all horses belonging to an affected family; all localities that are damp, foggy, cloudy or relaxing; as well as ill-appointed stables. Maintain good health and condition by sound feeding, watering, housing, grooming and exercise. When threatened remove to a drier and more bracing climate.

Treatment.—As for iritis. Some cases, like rheumatism, are benefited by colchicum and the free use of alkalies (carbonates or acetates of potassa or soda). Those that present increased tension and hardness of the eyeball should be early treated by *iridectomy*, which can, however, only be undertaken by the surgeon. All cases should have a course of tonics (oxide of iron, nuxvomica, ginger) as soon as the violence of the fever has abated, and should be submitted to a regimen calculated to improve their condition so as to ward off a new attack. Recovery from a particular attack may be expected in from six to ten days, and this contributes to sustain the reputation of such ridiculous resorts as knocking out the wolf teeth, and such injurious ones as cutting out the haw (hooks).

CATARACT.—This is the most constant result of internal ophthalmia, though it may occur from other causes, such as diabetes or uræmia. The condition is opacity of the lens, and may be recognized as a white speck or a white, fleecy cloud, filling, in the worst cases, the whole

of a widely dilated pupil. It is best seen with the animal looking out of the stable door, and with a dark background. A still more satisfactory examination can be made with a lighted taper in a dark room. Three images of the taper are reflected, (1) from the surface of the eye (cornea), (2) from the anterior surface of the lens, and (3) from the posterior surface of the lens. The two anterior are upright, the posterior is inverted. If either of the two posterior images is changed into a diffuse white haze in passing over any part of the pupil it implies an exudation into that part of the lens—a cataract. Haziness of the large anterior image is only caused by opacity of the cornea.

Treatment.—Newly formed cataracts will sometimes clear up by absorption, under such treatment as is adopted for inflammation, but the rule is that an opacity of the lens once found, is permanent. In cattle and sheep the lens may be extracted or depressed as in man, but in the horse such an operation would be worse than useless, as without spectacles he could never see things in their right form or position, and would become an incorrigible shyer. Better leave him blind. Cases not due to recurring ophthalmia may be benefited in the long run by applying a drop of phosphorated oil (phosphorus 2 grs., almond oil 1 oz.) to the eye daily, for several months.

PALSY OF THE NERVE OF SIGHT.—AMAUROSIS.—GLASS EYES.—*Causes.*—Congestion, tumors, dropsy or other diseases of the brain. Injury to the nerve of sight by pressure or otherwise. Inflammation with exudation into the retina. Excess of light. It may be symptomatic from overloaded stomach, from bloodlessness, and sometimes from gestation.

Symptoms.—Eyes unnaturally clear from wide dilatation of the pupils. Failure of the pupils to contract when exposed to light or sunshine, or to dilate in darkness. The subjects do not wince when a feint is made to strike them, unless the hand produces a current of air. The animals step high to avoid obstacles and have

very active ears, which are constantly exercised to make up for lack of sight.

Treatment.—If due to removable cause stop this, then blister the cheek or behind the ear, as for ophthalmia, and give nerve stimulants (strychnia, nitrate of silver, etc.)

Among the other affections of the eye are *Glaucoma*, the true nature of which can only be ascertained with the ophthalmoscope; *Cancer*, which demands the skill of the anatomist for removal; *Staphyloma*, or vascular tumor of the cornea; *Worm in the eye* (*Filaria Oculi*) which is to be extracted by skilful puncture; etc.



CHAPTER XV.

DISEASES OF THE NERVOUS SYSTEM.

General causes. Epilepsy. Falling sickness. Chorea, St Vitus's Dance, St. Guy's Dance. Vertigo, Megrims in horses. Lock-jaw, Trismus, Tetanus. Convulsions, Fits. Sleepy Staggers, Coma Somnolentum. Apoplexy. Inflammation of the Brain, Phrenitis, Encephalitis, Cerebral Meningitis. Inflammation of the spinal cord, Myelitis, Spinal Meningitis. Epidemic Cerebro-spinal Meningitis, Cerebro-spinal Fever. Enzootic Myelitis in sheep. Trembling, Hydro-rachitis. Paralysis. Loss of sensation or voluntary motion. General Paralysis. Paraplegia, Palsy of the hind limbs. Hemiplegia, Palsy of one lateral half of the body. Facial Paralysis. Other local palsies. Stomach Staggers and Acute Lead Poisoning. Sun-stroke.

The frequency of these affections bears some relation to the development and activity of the great nerve centres and especially the brain. They are often symptomatic of other diseases, the irritation being conveyed along the nerve to the nerve centres so as to derange their functions; at other times they have their origin in these centres themselves. Among common causes may be named: exposure to intense heat or cold, especially with a dry parching atmosphere; excess of light; deranged or excited circulation, as a loss of blood or plethora, obstacles to the return of blood from the head, by the jugular veins, or imperfect supply from thickening of the cranial bones; the influence of poisons, pressure, etc.; severe over-exertion; digestive, hepatic and urinary disorders, and parasites.

EPILEPSY—FALLING SICKNESS.—This is seen in dogs, cattle, horses and pigs in about the order named. It usually exists independently of any observable change of brain structure. Thus, in dogs it follows distemper, or depends on teething, worms in the stomach or intes-

tines, or acari in the nasal sinuses. In pigs indigestible substances in the stomach may determine it. Brown-Sequard showed how it could be developed at will in Guinea-pigs by tickling the neck, and has even produced it in the human subject. In all animals it may be looked on as, generally, a reflex act. Abscesses, tumors, etc., of the brain have been found in certain instances in horses, and the malady has supervened on a severe fright and chase, or a broken horn or other injury to the head in cows. Probably in these cases the disease of the brain has rendered it more susceptible to the impression coming from a distant part of the body. The disease has proved hereditary in cattle.

Symptoms.—Sudden loss of sensation and voluntary movement, with convulsive contraction of the muscles of the trunk and limbs. The patient may or may not appear dull or stupid for some time, but the attack is always sudden, the victim crying, falling to the ground, stiffening all over, with clenched jaws, frothing at the lips, and fixed red eyeballs. The attack may last for one or several minutes, after which the muscles relax and the animal becomes conscious but retains considerable dulness or languor for a day or more. The attacks are more or less frequent according to the activity of the exciting cause.

Treatment.—Remove the causes—worms or other irritants in the intestinal canal or elsewhere:—in excitable plethoric animals restrict diet and give more exercise; in the bloodless, feed highly and give iron and bitters; in dyspeptic pigs give sound food and bitters (gentian, quassia, camomile, boneset, serpentaria, myrrh,) with iron. In excitable stallions castration is usually needful. During the attack inhalations of chloroform or ether, or the injection of these agents or of chloralhydrate will serve to cut short the attack. If dependent on irritation of some known part of the surface, attacks may be obviated by cutting the nerves proceeding from this part, or better, by light firing with an iron at a red or white heat.

CHOREA—ST. VITUS'S DANCE—ST. GUY'S DANCE.—Mainly seen in the dog and horse. Occurs in subjects debilitated or worn out by disease, as in dogs by distemper. There is no constant structural change in the brain, but the occurrence of the disease as a consequence of exhausting disorders and the excess of urea, etc., in the urine, may be taken as implying an altered state of the blood, and of the processes of sanguification.

Symptoms.—Momentary spasms of the voluntary muscles, leading to jerking of one or more limbs, of the head or of the entire body. This continues without intermission in sleep as in walking, and, by wearing the subject out, increases the disorder. In the horse it occurs mainly in the hind limbs, but will also attack the fore, and temporarily the muscles of the body.

Treatment.—Re-establish health and vigor by abundant nourishment, open air exercise, tonics (sulphate and carbonate of iron, cascarilla, quinia,) cold baths, rubbing dry afterwards, and strichnia. Nerve sedatives (chloralhydrate) may be given to check or moderate the spasms.

VERTIGO—MEGRIMS IN HORSES.—An equine disease characterized by sudden and temporary loss of sensation and voluntary motion, with trembling, and it may be champing of the jaws, but without the general spasms of epilepsy.

Causes.—Brain disorders such as tumors, congestions, effusions, etc., or modified circulation from compression of the jugular veins, or disease of the heart. Plethora is a frequent cause in the young.

Symptoms.—The animal drawing a load, especially up hill, with a tight collar, driven hurriedly in extreme heat, or in a strong glare of sunshine or snow, suddenly hangs on the reins, slackens his pace, staggers a little perhaps, and if not stopped, drops in harness, first it may be starting to one side or rearing up so as to fall back over the driver. If stopped on the first sign of failing, the attack may usually be warded off. If it has taken place, the loosening of the harness and a few minutes rest will generally bring the animal round, so that he can get on

his legs, but he remains nervous and excitable for several days.

Prevention—Treatment.—In plethoric young horses improve the condition by restricted diet and regular increasing exercise, or turn out to grass for a time. Give an occasional laxative and diuretic. Avoid tight or badly fitting collars, or whatever presses on the veins of the neck. Shelter the top of the head from the direct rays of the sun by a sunshade. Wear a wet sponge constantly between the ears when at work. When the premonitory symptoms appear, stop, slacken the collar, cover the eyes, apply cold water or ice to the head and neck; blood may even be drawn from the palate, the temporal artery, or the jugular vein. This should be followed by an active purgative (aloes, Glauber salts,) and nerve sedatives (chloral-hydrate, bromide of potassium). A laxative diet must be kept up for some time or a run at grass allowed.

LOCK-JAW—TRISMUS—TETANUS.—This consists in persistent cramps of the voluntary muscles. When confined to those of the face it is *trismus* or *lock-jaw*, when general, *tetanus*.

Causes.—Wounds, especially of unyielding structures, like the foot, the firm fibrous layers covering the limbs, shoulder or croup, or the bones (tail). Wounds implicating large sensory nerves, or enclosing rust, gritty matters, or castrating clamps, or subject to chafing as between the thighs, are occasional causes. In other cases exposure to cold or wet, or a continual dropping on some part of the body is the cause. In still others it appears without any obvious reason, though probably from internal lesions. It is remarkable that it rarely occurs until wounds are well advanced in healing. In lambs it has been observed in connection with overfeeding of the ewes on trefoil, grain, etc., as well as from exposure.

Symptoms.—General stiffness; hardness of the affected muscles; protusion of the haw from the inner angle of the eye, over the ball, becoming more marked if the

animal is excited, as by jerking up the head ; in the worst cases the head is elevated and carried stiffly, the tail raised and trembling ; the legs directed slightly outward like four immovable posts, and in walking are lifted almost without bending ; the animal cannot lie down, or if he gets down, rouses the spasms fatally in his struggles to rise ; the bowels are always torpid ; the breathing is excited, and in bad cases stertorous ; and though the spasms never give way they appear in paroxysms, which are easily roused by movement, the presence of strangers, loud talking, banging of doors, rustling of straw, or any other noise or commotion. It usually proves fatal by the cramps of the muscles of the throat (larynx) and chest.

Treatment.—Secure perfect quiet in a dark box, safely locked from curious observers ; place slings beneath the patient, so that he can stand clear of them or rest in them at will ; remove straw or other source of excitement ; feed very soft bran mashes or thick gruels, from such a level as does not require any dropping of the head to reach them ; give a strong dose of purgative medicine (horse, aloes ; sheep, ox, sulphate of soda or magnesia ; swine, dog, castor oil,) following this up by antispasmodics, three daily (belladonna, prussic acid, chloral hydrate, lobelia, tobacco, etc.,) or these may be given by injection, or chloroform, ether or nitrate of amyle by inhalation. If it does not excite the animal too much, give a steam bath, or a thorough perspiration with hot rugs covered with dry ones. The bowels must be kept open by small doses of powdered croton seed or podophyllin mixed with solid extract of belladonna, and smeared on the back teeth as often as may be necessary. A bad case will require six weeks to acquire complete ease of movement.

CONVULSIONS. — FITS. — Seen more frequently in young dogs and cats during teething, and in bitches at the period of parturition or when reduced by suckling a large litter. In dogs or pigs they are common from indigestion or intestinal worms, and will occur in all animals from disorders in the brain or poisons in the circu-

lation. The *symptoms* are those of sudden agitating spasms of one or more parts of the body, usually protrusion and redness of the eyeballs, and frothing from the mouth, with complete insensibility. *Treatment* consists in removing the causes as far as ascertained; lance inflamed gums; expel worms or irritating matters from stomach and bowels; correct dyspepsia by good feeding, air, exercise, lodging, and by tonics (bitters, iron, etc.) The convulsions may be checked by such agents as ether or chloral-hydrate given by inhalation or injection.

SLEEPY STAGGERS. — COMA SOMNOLENTUM. — A chronic disease of horses, characterized by drowsiness, with impaired consciousness and voluntary movement, without fever. It may be associated with pressure on the brain by tumors, soft or bony, but above all by serous effusion. Increase and decrease of the brain, and thickening of its membranes are other occasional concomitants. It appears to be at times connected with deranged blood-forming processes, as in diseases of the right heart, lungs and liver, or with defective elimination, as in kidney disorders.

Symptoms.—Sleepiness, listlessness, want of life and intelligence, a stupid demented look in the eye, drooping lids, unsteadiness in the gait, perhaps only seen in turning or backing; in worse cases the patient will twist the legs over each other in walking straight, or will even rest the head or haunches on manger or stall. The bowels are torpid. The symptoms are like those of stomach staggers, without the abdominal disorder.

The animal may recover so as to work well in winter, while utterly useless in summer, and this state may last for several years. A complete recovery is rare, and yet it is occasionally seen, everything depending on the structural changes existing. But even in the incurable cases the progress may be retarded by treatment.

Treatment.—In hot weather keep in a cool, well-aired place, or in the open air in the shade. Give soft, laxative diet, free access to cold water and an occasional

purgative (sulphate of soda). A course of tonics (iron, nux vomica, gentian), and diuretics (digitalis, iodide of potassium, bromide of potassium) are often useful. Blisters may be applied to the neck or limbs if there seems to be effusion. The correction of any existing disorder in the lungs, liver or kidneys, will increase the prospects of cure; when well enough to use, such horses should wear a breast-strap in place of a collar, and should not be overdone. They should never be used for breeding purposes.

APOPLEXY.—Sudden loss of sensation and voluntary motion from effusion on the brain, and associated with a turgid condition of the blood-vessels of the head and neck.

Causes.—It occurs in plethoric animals during exertion, in those suffering from softening of the brain, the result of plugging of the veins with fibrinous clots, of concussion, congestion, etc. The *symptoms* are congestion of the head, dullness, heaviness, followed by complete paralysis, sensory and motor, loud stertorous breathing, and dilatation of the pupils.

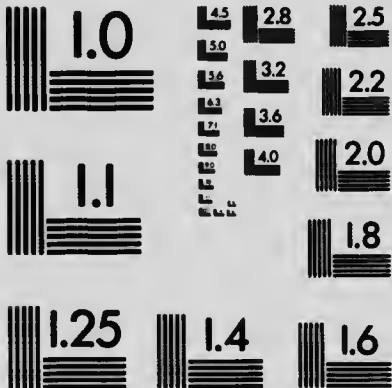
Treatment.—In the early stages, before the patient is paralyzed, apply cold water or ice to the head, bleed from the temporal artery (just behind the eye) or the jugular vein, keep perfectly quiet, and freely open the bowels.

INFLAMMATION OF THE BRAIN. — PHRENITIS. — ENCEPHALITIS. — CEREBRAL MENINGITIS.—This is seen in all domestic animals, but especially in horses, oxen and sheep. Among the *causes* may be mentioned: blows on the head with concussion of the brain or fracture of the cranial bones; plugging of the vessels in the brain by clots formed in diseases elsewhere; infection of the blood with pus or putrid animal fluids; sudden changes of temperature; exposure to extreme heat or cold; the over-exertion of plethoric animals; alcoholic poisoning from feeding spoiled products of distilleries; congestion from a tight collar, loss of jugular, or diseased heart;



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sympathetic nervous disorder from indigestion; the growth of tumors or parasites in the brain; feeding on ergoted grasses or smut.

Symptoms.—If the brain substance alone is involved there is usually dullness, stupor and palsy, sensory and motor; if the membranes covering the brain, there is more violence, delirium, irregular movements, pawing, stamping, champing the teeth, and partial or general convulsions. In either case there is trembling, elevated temperature, excited pulse and breathing, heat about the upper part of the head, injected, glaring eyes, rolling or set, extreme excitability and violent trembling, even when just aroused from stupor. The patient will sometimes bore his head against an obstacle, or rest his haunches on any object within reach. The violence is not necessarily continuous, but usually occurs in paroxysms, leaving intervals of stupor and comparative quiet. During the paroxysm the subjects may cry: horses neigh, cattle bellow, sheep bleat, pigs squeal and grunt. During the period of stupor the pulse and breathing are usually slow, and this applies also to those cases in which the disease has merged into a condition of vertigo, coma or paralysis.

Treatment.—Apply ice or cold water to the head, give injections of turpentine and oil, a strong purgative (horse, aloes and croton; sheep, ox, Glauber salts and croton; pig, croton beans,) with chloral-hydrate and ergot; bleed from the temporal artery and jugular vein, and follow up with diuretics and sedatives (nitre, bromide of potassium). The animal should be kept in a cool airy stall. If paralysis follows, treat as for that disease.

INFLAMMATION OF THE SPINAL CORD.—MYELITIS.

—SPINAL MENINGITIS.—The *causes* are similar to those of *phrenitis*. The disease may show itself by paroxysms of convulsions, with exalted temperature, increased circulation and rapid breathing, finally merging into paralysis; or it may be manifested at once by palsy without previous spasms, but with coldness, and usually dryness, of the paralyzed part, though the anterior part of the

body may be bathed in perspiration. There may be tenderness on striking the spines in the affected region of the back, and there is great pain and unsteadiness in any attempt at movement, even though the patient may be able to stand. There is no redness of the urine as in *asotæmia*.

Treatment.—Apply cold water or ice to the affected part of the spine; cup or leech if this can be done; purge as in *phrenitis*, adding ergot of rye or chloral hydrate. As improvement sets in blister the back (cantharides, mustard, etc.) and give diuretics, chloral-hydrate, bromide of potassium, ergot of rye. Care must be taken to turn the patient often if unable to stand, giving a soft dry bed, and to draw off the water frequently with a catheter unless it is passed spontaneously.

EPIDEMIC CEREBRO-SPINAL MENINGITIS.—CEREBRO-SPINAL FEVER.—Inflammation of the substance and coverings of the brain and spinal cord in horses, sometimes prevailing widely in stables or cities, from some cause acting generally. The true cause is unknown, though in many cases debilitating conditions, like unwholesome food or water, overwork, sudden exposure to intense heat or suddenly induced plethora, will serve as immediate excitants of the morbid process. It is peculiar to no season, but has not been recognized in Europe.

Symptoms.—These are varied according to the case. Some are seized abruptly with cramps of the voluntary muscles, especially those of the neck and hind limbs, which soon give place to general palsy—motor and sensory. In other cases the onset is slow. There may be trembling, dullness and lassitude for some hours or days, or there may be some local paralysis, like that of the throat or lips, incapacitating the animal from swallowing liquids, or causing profuse salivation. But sooner or later, in all cases alike, paralysis sets in and the animal is barely able to support itself, or, if worse, lies prostrate on his side with limbs extended and flaccid. If the case is to prove fatal, coma and complete stupor usually precedes death. If recovery ensues, appetite is often preserved through-

out, and restoration of the general health precedes the disappearance of the palsy, sometimes by several months. The pulse throughout is little varied, being usually slow and soft at first, and weaker and more rapid as the disease advances. Breathing, at first little affected, becomes deep and stertorous as coma sets in. The surface temperature is cool and that in the rectum usually natural. The bowels are generally costive, and the urine unchanged and may pass involuntarily. Tenderness of the spine may sometimes be detected by percussion, and will guide to the precise seat of local disease.

Treatment.—The disease is very fatal, though varying much in successive outbreaks. Excepting in cases of complete paralysis and coma the patient should be placed in slings and have what laxative food (bran mash, roots, etc.) he will take. Cold lotions (nitre and sal-ammoniac) or bags of pounded ice and bran should be applied to the spine, and hand-rubbing and mustard or other stimulating embrocations, to the limbs. Copious injections of warm water may be thrown into the rectum, containing in solution aloes or other purgatives. Opium or chloral-hydrate may be given to relieve extreme pain or spasms, but the agents which are especially demanded in the early stages are bromide of potassium and ergot of rye. These may be used as injections, or, still better, subcutaneously, the first in strong solution, the last as *ergotine*. When swallowing is perfect they may be administered by the mouth. When the acute symptoms have passed, stimulants (ammonia, ether, alcoholic fluids,) and tonics (quinia, cascarilla, boneset, etc.,) may be given, and blisters (mustard, Spanish flies,) applied along the spine. The remaining palsy must be treated on general principles. (See Paralysis.)

ENZOOTIC MYELITIS IN SHEEP.—TREMBLING.—HYDRO-RACHITIS.—The true cause of this affection is unknown, but it has prevailed especially on newly reclaimed land which has undergone a great temporary increase or fertility. In some parts of Scotland its pre-

valence is circumscribed by the windings of a river (Tweed) and without any ostensible cause; or it is fatal on one slope (south) of a hill, while the opposite escapes; or again it prevails on the richest table-lands. It attacks mainly lambs or sheep under $1\frac{1}{2}$ years old, and proves very fatal, often destroying the entire offspring of the year.

Symptoms vary somewhat. Many lambs appear paralyzed when dropped, either in the hind or fore extremities or both, others are attacked a few days or weeks later. Sometimes the head or entire body is drawn to one side by a spasm, in other cases there is spasmodic movement of the limbs in progression (louping-ill). There is usually much apparent stupor and drooping ears, but the patient is easily startled, and in its efforts to escape will tumble headlong. A nervous trembling is frequent, and there is tenderness or itching of the loins or croup.

Treatment of the lambs would be on the same general principles as in inflammation of the spinal cord in other animals, but will rarely pay. *Prevention* is to be sought by keeping breeding ewes and young sheep from newly limed land; by using none for breeding under two years old, and by close attention to food, water and shelter, to secure good health during pregnancy.

PARALYSIS.—LOSS OF SENSATION OR VOLUNTARY MOTION.—*Loss of voluntary motion* is known as *Motor paralysis*, *loss of sensation* as *Sensory paralysis* or **ANÆSTHESIA**. Paralysis is also *peripheral* when it occurs from injury to the nerves (chilling, tearing, cutting, pressure, inflammation, degeneration, etc.,) and *central* when it arises from injury to the great nerve centres, the brain and spinal cord. Sensory and motor paralysis may exist independently of each other, and loss of sensation on one side of the body may co-exist with increased sensitiveness on the other. An injury to one side of the brain usually paralyzes sensation or motion on the opposite side of the body. Injury to the lower part of one lateral half of the spinal cord, paralyzes motion on

the same side of the body behind the lesion; while an injury to the upper part of one lateral half of the cord paralyzes sensation on the opposite side behind the hurt, and in a small adjacent part of the same side, while the rest of this side behind the lesion is rendered more sensitive. Space forbids our following further the indications furnished by the nature and seat of the paralysis, as to the probable lesions in the central nervous system; this must be left for a larger work.

GENERAL PARALYSIS.—Paralysis of the face, trunk and extremities, but without the implication of the muscles of respiration, may arise from pressure on the brain, or as a reflex action from distant organs (impacted stomach, constipation, pregnancy, etc.,) and may not be incompatible with life. If from section or cutting of the spinal cord in front of the fifth neck-bone (broken neck, pithing,) it is promptly fatal by abolishing respiration.

PARAPLEGIA.—PALSY OF THE HIND LIMBS.—This is a common form of paralysis resulting from broken back or loins, or it may reflect from disordered indigestion, etc., (in horses, cattle, dogs). It may also occur from tumors or parasites in the spinal cord, from bony swellings, the results of sprains, from inflammation and softening of the cord, and from *lolium temulentum* (darnel), and the newly ripened seeds of its allies, *lolium linicola* (flax rye-grass), and *lolium perenne* (perennial rye-grass). The chick vetch, millet, ergot and various blood poisons (taurocholic acid, leucin, tyrosin, urea, etc.,) have a similar action.

HEMIPLEGIA.—This consists in paralysis of one lateral half of the body, to the exclusion of the other, usually as the result of some disorder of one side of the brain or spinal cord. It occurs in all animals, but less frequently than paraplegia.

FACIAL PARALYSIS.—This sometimes occurs from a continuous current of cold air striking on the side of the

face, but also from bruises behind the eye and joint of the jaws, by a badly fitting bridle, a collar, or apparatus commonly used for breachy horses. Cows suffer from similar injuries from stanchions. Finally it may result from disease of the brain or middle ear.

Other *local paralysis*, such as of the *ear, eyelids, lips, tongue, larynx, tail*, etc., result from corresponding causes.

Treatment for Paralysis.—Our first object must be to remove the cause, whether this consists in digestive, urinary or uterine disorder, in congestion, inflammation, or pressure on the brain or nerves. When a nerve is cut across, we must wait for its reunion. When the cause is irremovable the paralysis is necessarily incurable. In cases of inflammation we must proceed as advised for inflammation of the brain or spinal cord. Then apply cold douches and friction to the paralyzed part, followed by a blister. Blisters may also be applied to the neighborhood of the nerve centre presiding over the part. In some cases the application of the hot iron lightly is beneficial. A current of electricity directed along the course of the nerve or through the paralyzed muscles may be repeated daily with the best results; or nerve stimulants (*nux vomica, strychnia, nitrate of silver*, etc.) may be given daily, commencing with small doses and gradually increasing them until twitching or slight cramps of the muscles are seen; then stop their administration for a few days, and resume with half the former doses. Never continue when the system is affected, as shown by muscular jerking. In some cases of local paralysis (retina, etc.) excellent results are obtained from subcutaneous injections of strychnia.

STOMACH STAGGERS AND ACUTE LEAD POISONING.

—These are affections commencing with functional stomach and brain disorder, and leading to congestion and inflammation of the great nerve centre, and deserve a special notice.

The *stomach staggers* of horses and cattle usually arise from eating particular articles of food, such as the different forms of rye grass, millet, vetches, tares, etc., wh

ripening and not yet cured. A poisonous principle exists, which, in the case of the *lolium temulentum*, has been separated as an extract, and administered with fatal effects to horses, cattle and dogs. It acts by paralyzing the stomach and congesting the brain. Cattle will suffer similarly from the very rich vegetation of spring, from the dry irritating fibrous grass mixed with the aftermath, or from a sudden change from soft to hard water.

Symptoms.—The first effect is drowsiness, the horse being sluggish at work, and falling asleep while eating or drinking, or the ox leaving his fellows and lying down with his head on his flank, his eyelids semi-closed and his pupils dilated. The bowels continue to move, passing indigested matter and wind, the abdomen is full and the seat of frequent rumbling, and the appetite is retained so that the torpid stomach is still further distended. This state of things may continue for several days, and is followed by imperfect control over the limbs, hind or fore, so that the subject sways unsteadily in walking, and leans his head on the manger and his quarters on the stall when in the stable. Sometimes paraplegia is the first sign, drowsiness being absent throughout. The drowsiness in time gives place to restless and involuntary actions, jerking of the head, champing of the jaws, pushing the head against the wall, movements of the limbs, walking in a circle or straight forward regardless of obstacles, springing or dashing violently about, convulsions, etc. These periods of violence or delirium occur in paroxysms, leaving intervals of comparative, though not absolute, quiet and stupor. If not carefully secured the animals often kill themselves during one of these paroxysms. The pulse and breathing are slow at first, but accelerated in the later stages.

ACUTE LEAD POISONING in cattle results from eating red or white paint (often the refuse of paint-pots which has lain for years in the soil), sheet lead, spent bullets, etc., or from drinking from dishes which have held sugar of lead or of soft water that has run through leaden

pipes or stood in leaden cisterns. The *symptoms* are usually indistinguishable from those above described, the preliminary dullness and drowsiness merging into active delirium, with reckless dashing about and violent bel-
lowing.

Treatment in all cases consists in stopping the ingestion of the poison and carrying off from the bowels any that still remains there. Double the usual amount of purgative medicine must be given, with stimulants, their action favored by injections and the brain symptoms kept in check by applying cold water or ice to the head, as well as by bromide of potassium. In *lead poisoning* sulphate of magnesia or soda are the appropriate purgatives, and $\frac{1}{2}$ oz. sulphuric acid should also be given in two parts of water to precipitate in an insoluble form any lead that may still be retained. If later there is a suspicion of lead being retained in the system give iodide of potassium. Should paralysis persist when the active symptoms have passed away, treat that on general principles.

SUN-STROKE.—This is especially common in horses in the hot months and in the large cities, but is seen in cattle and sheep as well, when exposed to the full glare of the sun. Among the causes which co-operate in its production may be mentioned foul, badly aired stables, tight collars or girths, overwork in hot weather, heavy milking in cows, obesity, poor, unwholesome food, and indeed any health-deteriorating condition. Horses are usually attacked while being speeded, or at heavy draught work, in a collar, and exposed to the direct and reflected rays of the sun, as in a valley, on a hillside or in the streets of a city.

Symptoms.—Sometimes without any observed premonitory sign the horse will suddenly stop in harness, droop his head, prop himself out on all four limbs, pant violently, fall, and after some convulsive movements, die in a state of coma, marked by stertorous breathing. In other cases the attack is slower, the horse flags in gait, responds very imperfectly, if at all, when urged, hangs on the bit,

may perspire freely, or have a dry burning surface, and becomes unsteady on his limbs. If still urged he falls, but if allowed will stand with legs extended, head low and stretched out, nostrils dilated, superficial veins distended, eyes protruded and red, pupils contracted, breathing rapid and wheezing or deep and stertorous, the pulse quick and weak, and the heart-beats tumultuous. This is followed by prostration, a state of unconsciousness, palsy or convulsions and death. If recovery ensues it is followed by dullness, uncertain movements of the limbs, drowsiness, or other sign of brain disease.

Treatment.—Douche the head and neck with cold water, and make the same application to the whole body, unless the weakness of the patient forbids this. Throw stimulating injections into the rectum (ammonia, or oil of turpentine and oil). If the convulsions are aggravated by the douche, use injections of chloral-hydrate instead. Apply frictions and mustard embrocations to the limbs and the sides of the neck, especially when unconsciousness and coma comes on. Improvement may be expected when consciousness returns. A failing pulse should be met with stimulants by the mouth and rectum. To *prevent* sunstroke much may be done by keeping in vigorous health, avoiding ill-aired stables, using breast-straps in place of collars, and wearing a sun-shade and a small wet sponge on the top of the head.

PARASITES IN THE BRAIN. See *Parasites*.

CHAPTER XVI.

SKIN DISEASES.

Classification. General Causes and Treatment. Congestion of the Skin, Chafing, Chilling, Irritants, Sun's Rays. Congestion with Pimples, Papules. Inflammation with Blisters, Vesicles. Inflammation with Pustules. Inflammation of horses' heels, Swelled Legs, Cracked Heels, Grease, Grapes, Scratches. Inflammation of the skin with nodular swellings, Tubercles, Surfeit, Urticaria. Scaly skin disease, Pityriasis, Mallenders, Sallenders, Scratches. Boils, Furuncles. Nervous irritation of the skin, Neurosis, Prurigo. Warts, Callosities, Black-pigment Tumors. Epithelial Cancer. Parasitic skin diseases. Common Ringworm. Tinea Tonsurans. Honey-comb Ringworm, Favus. Diffuse Baldness, Tinea Decalvans, Parasitic Pityriasis. Parasitic Grease. Contagious Foot-rot. Mange. Scab. Itch. Scabies. Acariasis. Ticks. Ixodes. Warbles, Larva of the Gadfly. Attacks of Flies, Maggots. Sheep-tick. *Melophagus Ovinus*. Fleas. Lice. Erysipelas. Wounds—cut, punctured, bruised, torn, poisoned. Burns. Scalds.

Skin Diseases will be considered under the following heads:

1. *Diseases due to general causes* and embracing all the grades of inflammatory action:—congestion—a red pointed eruption (papules)—a similar eruption with minute blisters (vesicles)—the formation of larger hemispherical blisters (bullæ)—the formation of pus in these vesicles (pustules)—the formation of round nodular transient swellings (tubercles)—the excessive production of scales or dandruff (squamous)—pustules with circumscribed sloughing of the deeper layers of the skin (boils).

2. *Diseases manifested by deranged sensation*—Neurosis.

3. *Diseased growths*—warts—callosities—epithelial cancer.

4. *Parasitic diseases*,—vegetable and animal.

5. *Diseases connected with a specific poison*—different forms of variola (pox)—measles—scarlatina—erysipelas—malignant pustule, etc.

6. Wounds. Burns. Scalds.

General causes.—These are exceedingly varied. Many cases are the result of simple local irritation, as chafing, radiating heat, cold and wet, chemical and mechanical irritants, or the presence on the skin of parasitic plants or animals. A large class is due, however, to disorders of internal organs with which the skin is in sympathy, or that have failed to transform or throw off elements that prove cutaneous irritants by their presence in the blood, or when being excreted abnormally through the skin. Disorder of the liver, stomach, bowels, kidneys and lungs, are especially apt to act in this way. Sometimes skin disease is a mere symptom of general ill-health.

General treatment.—The first object is to discover and remove the cause; then if the disease is of an inflammatory nature and acute, soothing agents may be applied to the irritated skin—fomentations with tepid water, oxide of zinc powder or ointment, starch, lycopodium, spermaceti and almond oil, solutions of sugar of lead, sulphate of zinc, or carbolic acid, collodion, etc. Give internally cooling laxatives (sulphate of soda, tartrates or citrates of soda or potash,) and diuretics (acetate of potassa or ammonia, carbonate of potassa or soda). In weak states tonics are often wanted, whereas in plethoric subjects depletion is equally essential. A cool, clean, airy stable and cleanliness of the skin are all-important.

If the disease is not so recent or the acute symptoms have been subdued, a more stimulating class of local applications are in order: ointments of iodine, sulphur, mercury, nitrate of mercury, tar, oil of tar, oil of turpentine, oil of ...e, etc., may be used. Supersedents, too, may be given internally: sulphur, antimony, arsenic, mercury, Dunovan's solution, are examples.

CONGESTION OF THE SKIN.—Simple redness, heat and tenderness, with no dark color nor eruption. This may coexist with all the different forms of inflammatory eruption according to the degree of irritation at different points.

It occurs: From *chafing*, in the axilla, between the thighs, in the heels or under the harness in hot weather;

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from *chills after being wet*, in the heels of horses and on the teats of cows exposed to wet in winter; from *hardened mud* in the space between the hoofs in cattle, sheep and pigs; and from *the sun's rays* on white-faced or white-limbed animals.

Treatment.—If the surface is only tender, wash clear and apply a solution of table salt, sugar of lead ($\frac{1}{2}$ oz. to 1 qt.) or a little camphorated spirit. If the surface is abraded (raw) use bland powders (oxide of zinc, starch, lycopodium,) wool, collodion, glycerine 1 oz., aloes 20 grs., or, if it can be kept covered, sulphurous acid solution and glycerine (equal parts), laxatives, diuretics or tonics must be used according to the indications. It is all important to avoid further irritation. Light, well-fitting harness must be used, and the stuffing taken out and the part beaten down where necessary, to avoid pressure on a sore. Zinc fittings to the top of the collar are often very serviceable. So too, must exposure of affected heels to damp or mud, and the wetting of teats in milking, be carefully avoided.

CONGESTION WITH SMALL CONICAL PIMPLES.—PAPULES.—In this case there is an eruption of finely-pointed pimples without any watery exudation or blister. It is usually itchy and even painful, and by reason of rubbing may go on to exudation, with great thickening of the skin, bleeding scabs and open sores. Horses especially suffer in spring and autumn, at the time of shedding the coat, the eruption often confining itself to the neck, shoulders and limbs. On turning back the hair on parts which are itchy or sore, but that have not suffered from rubbing, the nature of the eruption will be seen, especially if a slightly magnifying glass is used. The affection usually gives away readily under the use of weak alkaline washes (carbonate of soda 1 dr., water 1 pint,) or soap-suds, a restricted laxative diet and gentle laxatives.

INFLAMMATION WITH VESICLES.—In this form of skin disease papules are crowned with little blisters, so

small and pointed as to require a magnifying glass to make them out distinctly (eczema), or as large as a small pea and rounded (herpes, bullæ). These forms are common in horses and dogs, and to a less extent in ruminants, especially in connection with disorders of digestion. Highly stimulating food, clipping and hot weather are particularly favorable to their development. Boiled food, diseased potatoes, green food or any change of diet may cause them. One form of this affection is induced by a too extensive use of mercury to the skin. Cattle suffer from eating the refuse of distilleries and gardens, garbage from kitchens, etc.; sheep are attacked after exposure to cold rains. Old horses suffer from an inveterate form in connection with bad food and want of grooming and wholesome stabling. In dogs, too, it becomes inveterate and chronic, the whole skin being denuded of hair and of a bright scarlet, with the characteristic eruption mixed with cracks, sores and scabs (red mange). In the milder forms, dogs suffer mainly inside the thighs or on the scrotum; horses suffer under the harness, and especially at the root of the mane and under the saddle, but the eruption may spread over the whole body; cattle suffer on the limbs, especially the hind, but not exclusively so.

The other eruptions are often mingled with the vesicles, the hairs become bristly, and as the skin is broken by rubbing, a bloody or straw-colored exudation concretes in scabs and mats the hair together, while elsewhere extensive raw sores appear.

Treatment.—Give a saline or oleaginous laxative, and follow up with acetate of potassa or other alkaline agents in the drinking water. If there are signs of disordered liver give small doses of podophyllin to keep the bowels slightly relaxed; if debility, bitter tonics. A restricted non-stimulating diet, (herbivora, mash, roots, etc.; carnivora, bread and milk, oatmeal porridge, etc.) pure air, cleanliness and skin washes of carbonate of soda or potassa, containing a few drops of carbolic acid, will prove valuable. In dogs this last agent should be omitted.

In all forms of inveterate and chronic eczema the scabs should be soaked in oil for a few hours and removed by washing, after which more stimulating applications may be resorted to: ointments of sulphur, iodine, iodide of sulphur, sulphuret of potassium, mercury, nitrate of mercury, etc., with or without alkalies. In some cases a few drops of oil of vitriol in a quart of water, will much relieve the itching and pain. In others the same end must be sought by adding prussic acid or cyanide of potassium in small amount, great care being taken to prevent the patient from licking it. Internally, use supersedents—arsenic, with or without iodide and bromide of potassium; or small doses of Dunovan's solution may be resorted to in bad cases.

INFLAMMATION WITH PUSTULES.—This differs from vesicles in this, that the elevations on the skin have the scarfskin raised by the formation below it of a white, purulent matter, in place of clear liquid. The prominent forms are those with large pustules (ecthyma), and those with small (impetigo). The hair stands erect, and scabs form on the surface covering the sores, especially after rubbing. Even if not rubbed, they dry up in scabs, which soon fall off.

Horses suffer mainly at the root of the mane, on the neck, the rump, and on the lips and face, especially if white; cattle and sheep, especially the young, are attacked on the lips and other delicate parts of the skin (vulva, etc.,) and pigs and dogs on any part of the body.

Causes.—It is often chargeable on some disorder of digestion, as the result of unwholesome food, or a sudden change of food, as from dry to green, or from one kind of pasturage to another. In young animals (foals, calves, lambs, kids, pigs,) it appears to be an occasional result of heated or otherwise unwholesome milk. Vetches affected with honey-dew have produced it in white horses or in white spots of those of other colors; and buckwheat has affected white sheep, pigs, goats, etc., in the same way. It may, however, arise from habitual exposure to cold

and wet, local irritation, as from rubbing, etc., or from disorder of other internal organs.

Treatment consists in softening the crusts with oil, washing them off with soap-suds, and applying soothing or gently astringent agents to the part (spermaceti and olive oil, benzoated oxide of zinc ointment, lime-water, sugar of lead lotions, etc.) When it attacks the root of the mane cut off the hair, and if the pain is excessive foment or poultice until the eruption comes to a head, when some of the above agents may be applied. When the pustules have burst and show little tendency to healing, this may often be hastened by touching the sores with a pointed stick of lunar caustic, or a weak solution of this agent (2 grs. to 1 oz. water) may be lightly painted over the part. The internal treatment consists in the administration of laxatives, followed by bitters (gentian, quassia, boneset, cascarrilla, willow bark, etc.) and diuretics. In obstinate or long-standing cases, the same treatment may be followed as in chronic eczema.

INFLAMMATION OF THE HEELS IN HORSES. — GREASE.—The skin in the region of the heel is so vascular and so abundantly provided with oil-glands, and is so frequently exposed to irritants, wet, cold, mud, filth, etc., that a special notice of its inflammatory condition seems demanded. The *causes* are a lymphatic constitution, with a tendency to stocking of the legs; a weak circulation, diseased heart, liver or kidneys, with swelled legs; washing the heels with caustic soap; leaving them wet and muddy when put in the stall; currents of cool air striking on the heels; irritant fumes from accumulated dung and urine; soaking of the heels in putrid pools in the straw-yard; standing in snow or in the slush of melting snow; and besides, any of the constitutional causes of other skin diseases. To these might be added *horse-pox*, *foot mange*, and an eruption associated with a *vegetable parasite*, but we must leave these to be considered with specific and parasitic diseases.

Symptoms.—We find all grades of inflammation in the heel: 1st, Simple swelling with dry heat, tenderness and

great lameness from inability to stretch the skin and bring the heel to the ground ; 2nd, Transverse cracks or chaps more or less extensive ; 3rd, A pinkish-white foetid discharge from the surface, with oftentimes some moderation of the lameness ; 4th, The eruption of pustules of variable size ; 5th, The formation of fungous growths (grapes), over the affected surface, of a size from a pea to a cherry, red, angry and covered with a foetid discharge. This last form often invades the frog, constituting *canker*. The same occurs in sheep as the result of long-continued irritation to the skin of the coronet, and is the worst form of non-contagious *foot-rot*. 6th, A sixth form of the affection (*scratches*) is much more common in our light American horse, exposed in the deep mud of spring, and consists in minute excoriations, becoming covered with thin scabs, which remain tender and troublesome for an indefinite length of time.

Treatment.—The prime essential is to avoid the cause, whether exposure to filth, cold, wet, local irritants, low condition, or disorder of some internal organ or function. If the inflammation runs high, a cooling laxative (Glauber salts, aloes,) and mild diuretics (nitre, iodide of potassium,) should be given, unless contra-indicated by low condition or debility. Tonics (iodide of iron) should be conjoined with gentle diuretics for weak patients, and the food should be cooling (in part green or roots). Gentle pressure from a bandage, evenly applied from the foot up, is beneficial.

In simple inflammation, without eruption or discharge, apply cloths wet with a weak solution of sugar of lead or other astringent, and in winter cover these with a dry bandage to prevent freezing. Or a poultice may be applied with a little sugar of lead lotion on the surface.

When cracks have appeared, apply a similar lotion with the addition of a few drops of carbolic acid or grains of chloral-hydrate (enough to give it an odor) ; or sulphurous acid solution, water and glycerine in equal proportions, covering promptly and perfectly with a bandage ; or, glycerine, aloes, etc.

In case of discharge or pustules the lotion may be

made with chloride of zinc or lime in place of sugar of lead, or finely powdered charcoal may be sprinkled over the poultice; carbolic acid or chloral will be equally in place.

When fungous growths appear more active measures are demanded. Strong carbolic acid may be applied to them individually, or better, pledgets of tow, saturated with tincture of the muriate of iron, should be bound on by a tight bandage extending from the hoof up. Or the growths may be snipped off with scissors and the muriate of iron applied; or they may be individually strangled by a stout thread tied round their necks, or cut off with the sharp edge of a red-hot blacksmith's shovel, a cool one being held beneath to protect the skin. Then apply any one of the antiseptics above mentioned.

Scratches are among the most obstinate forms of the affection, because not severe enough to demand the seclusion of the horse from wet, mud and snow. In feeding the subjects of this affection avoid all buckwheat, maize or other heating agents, and if it proves obstinate resort to the various internal remedies advised for chronic eczema. Locally use benzoated oxide of zinc; glycerine and aloes; ~~camphorated spirit and chloral~~; the same with a few drops of tincture of chloride of iron, etc. When irritation subsides and the scales drop off, leaving a healthy-looking surface, smear with a bland ointment (spermaceti and almond oil).

CUTANEOUS INFLAMMATION WITH NODULAR SWELLINGS.—TUBERCULES.—The most remarkable example of this is what is known to horsemen as *surfeit*, by veterinarians as *urticaria*. It occurs in spring and autumn in horses, cattle and pigs, and is at once connected with moulting and sudden changes of food or weather. With some fever, there appear on different parts of the body swellings varying in size from a pea to a walnut, and often running together so as to form extensive patches, which will close the nostrils, eyelids or lips, and put a stop to feeding and even threaten suffocation. There is

little pain or tenderness and the swellings are very transient, appearing and disappearing on different parts at short intervals.

Treatment consists in clearing out the bowels by a purgative (horse, aloes; ox, salts; pig, oil or jalap,) and following this up with bitters (gentian, etc.,) and diuretics (nitre, carbonates of soda and potassa).

SCALY SKIN AFFECTIONS.—PITYRIASIS.—These are exemplified in the scurfy, scaly affections, which appear in the bend of the knee (*mallenders*) and hock (*sallenders*) and on the lower parts of the limbs, by *scratches*, and by a scaly exfoliation and shedding of hair of the mane and face of old horses, and of different parts of the body in cattle. Some of these, like *mallenders*, *sallenders* and *scratches*, may commence as papules or vesicles, while the scaly affection of the face is often connected with a vegetable growth, but this form is distinguished by extreme tenacity, and a gradual progress from its point of origin; that which is dependent on constitutional causes is more diffused. They depend on the general causes of skin diseases—heating, unsuitable diet, sudden changes, imperfect grooming, heats of summer, disorders of the lungs, bowels, liver or kidneys, on oxalic acid in the blood, and some constitutional causes. Beside the scurfiness and loss of hair, the itching is often so extreme as to render the subject almost unmanageable, and useless for work.

Treatment.—A moderate laxative diet, consisting in part of roots (carrots and turnips), the free administration of alkalies (carbonate of potassa or soda, etc.), and if still inveterate a prolonged course of arsenic will be requisite. Locally use mercurial ointment, or, if extensive, sulphur or tar ointment, etc.

BOILS.—FURUNCLES.—These are too well known to need description. They consist in circumscribed inflammation of the deep layers of the skin, with pustule and sloughing of a limited part of the fibrous tissue. They are not uncommon on the legs of horses, and if a

number appear in succession are a source of great trouble.

Treatment.—While still a simple inflamed nodule they may often be arrested by incising crucially with a sharp knife and applying cold water bandages. Or apply a poultice or thick wet cloth to bring quickly to a head. If the resulting sore is indolent or unhealthy touch with nitrate of silver. The free internal use of alkalies (carbonate of soda) sometimes checks their production.

NERVOUS IRRITATION OF THE SKIN.—NEUROSIS.—PRURIGO.—This is often seen in horses that are overfed on grain (especially the more stimulating varieties) and hay, and have close, unwholesome stables. Hot weather is also a cause. Though occasionally associated with pimples or even vesicles, the irritation is found to be equally severe on parts devoid of eruption, yet the integument tends to become thickened and rigid as the disease persists. The irritation may be slight or so severe that the harness cannot be kept on. It must not be confounded with rubbing of the tail from pin-worms.

Treatment.—Purge, put on restricted diet, with roots, wash the skin with soap and water, and apply water slightly soured with oil of vitriol. If this, with carbonate of soda internally, fails to cure, a long course of arsenic is demanded.

WARTS.—CALLOSITIES.—CANCER.—BLACK PIGMENT TUMORS.—Warts are to be removed by scissors and the part burned with some caustic (lunar caustic if near the eye, butter of antimony, blue-stone, chloride of zinc, etc., elsewhere). Or they may be destroyed by tying a thread tightly round the neck of each, or by the use of the hot iron.

Callosities are common under the saddle (sitfasts). A circumscribed portion of skin, the seat of a former chafe, has become thickened and indurated to almost horny consistency. The skin around the edges is inflamed, raw and angry. It can usually be loosened by a poultice, so as to be easily removed with a sharp knife, after which it is to be treated as a common sore.

Black Pigment Tumors (Melanosis) are exceedingly common in gray and white horses, attacking the black parts of the skin (anus, vulva, udder, sheath, lips, eyelids, etc.,) and though sometimes cancerous are often quite harmless, and should always be removed with the knife.

Epithelial Cancer is not common in the lower animals, but is seen in the lips of horses and cats. Here again the knife is the best remedy.

PARASITIC DISEASES OF THE SKIN.

Leucosia

COMMON RINGWORM.—TINEA TONSURANS.—This is common in horses, cattle, dogs and cats, as well as in man, and is readily transmitted from one to the other. It is especially common in winter or spring, and occurs as round bald spots on the face or elsewhere, covered with white scales, and surrounded by a ring of bristly, broken hairs, or split hairs with scabs around the roots and some eruption on the skin. Soon this ring of broken hairs is shed and a wider bristly ring is formed. Among the naked eye characters the breaking and splitting of hairs in the ring, and the perfect baldness of the central part are the most significant. Chloroform bleaches the affected hairs, while the sound ones are unaffected. The microscopic appearances are the presence in the hairs and hair follicles of a vegetable parasite (*trichophyton tonsurans*).

Oxygonia
Cosmopolita

Treatment.—Shave the hairs from the affected part, or better, pull them out with a pair of pincers, and paint with tincture of iodine, or a solution of corrosive sublimate (40 grs. to 1 pt. of water), or of bisulphite of soda ($\frac{1}{2}$ oz. to 1 pt.)

HONEY-COMB RINGWORM.—FAVUS.—Common in cattle, dogs, cats, rabbits and chickens, as well as in children (scald-head). It shows the same general appearance of baldness advancing from a centre, which is described above, but a cup-shaped, yellowish scab results which has obtained for it the name. The parasite (*Achorion Schonleini*) appears to be but another form of the

fungus of ringworm affected by its conditions of growth, and especially by the weak and unhealthy condition of the host. *Treat* as for common ringworm.

DIFFUSE BALDNESS (TINEA DECALVANS).—PARASITIC PITYRIASIS.—Two other forms are seen in the horse, one attacking any part of the body, and recognized by the agglutination of five or six hairs together in a white crust, and the other attacking the heads of old horses, and characterized mainly by the scurfy product. Both are exceedingly inveterate, though not attended with excessive itching, and demand the persistent use of tincture of iodine or corrosive sublimate lotions in order to effect a cure.

In all those cases the harness, brushes, combs and woodwork must be washed with a solution of caustic potassa or soda, and then wet with iodine ointment or a solution of corrosive sublimate, otherwise all treatment may be fruitless. Horse blankets should be boiled for a length of time.

PARASITIC GREASE.—CONTAGIOUS FOOT-ROT IN SHEEP.—In inflammation of the horse's heel, attended with fungus-like growths (*grapes*), a vegetable growth is often present and seems to be a main cause of the disease. The *contagious foot-rot* in sheep presents the same appearance of the skin, and is presumably due to a similar parasite. With or without an abrasion, the matter from a diseased foot produces in the healthy one swelling, excoriation and fungus growths round the top of the hoof, as well as an excessive growth, softening and loss of cohesion of the horny elements below.

Treatment consists in laying bare the diseased surface, and applying active caustics and parasiticides. Pare the horn to the quick, and apply tow soaked in tincture of muriate of iron, butter of antimony, solution of blue-stone, or nitrate of silver, bind up firmly and repeat the dressing daily. All overgrown horn must be carefully removed, and means taken to prevent irritation from dried mud, etc.

MANGE. — SCAB. — ITCH. — SCABIES. — ACARIASIS. —
 These names among others are given to diseases of the skin caused by acari. Of parasitic acari there are three principal species: *Sarcoptes*, which burrow in canals in the scarfskin and are difficult to find and eradicate, and *dermatophagus* and *dermatocoptis* which live on the surface or among the scabs, and are more easily disposed of. Another species—*demodex*—inhabits the sebaceous glands of the skin in sheep and dog, and causes much irritation, with *acne-like* eruption. Among acari occasionally parasitic may be mentioned: the *dermanyssus* (misnamed hen louse), the *gamasus* of musty hay, and the *leptus* (misnamed jigger in the Western States), all excepting the last living on the surface and easily discovered. Lastly, a *tyroglyph* is accidentally parasitic on all domestic animals.

Of the *sarcoptes* there is one species lives on the horse, which will temporarily inhabit the skin of man; a second is peculiar to the goat; a third is common to dogs and swine; a fourth to cats and rabbits, and a fifth to chickens, horses and foxes.

One species of *dermatophagus* lives on the heels and legs of horses, another on the tail, neck, etc., of cattle, and a third on the pastern, limbs, and, less frequently, the trunk of sheep.

Of *dermatocoptes* there is also a particular species for each of these animals—horse, ox and sheep—though usually confounded with each other. These are the most common causes of mange, and from their non-burrowing habits are most easily disposed of.

Accessory causes.—Though the reception of the acarus is the one essential cause of mange, yet others conduce to its speedy diffusion—as poor condition, filth and warm seasons. Some acari, like the *dermatophagi*, may even seem to suspend operations in winter, and cause little or no trouble until the following spring.

Symptoms.—We must state these in general terms, throwing the whole class into one group. There is intense, uncontrollable itching, aggravated by hot weather or buildings, and by perspiration. If the affected

part is scratched the animal shows his gratification by moving his body as if rubbing, and especially (in horses) by a nibbling movement of the lips. In sheep the wool is torn off, and white tufts hang on the dark surface of the fleece. The skin is thickened and rendered rigid by exudation into its substance, as well as by the accumulation of crusts on the surface. In fine skins, like that of the sheep, there is a distinct papular eruption, and in all there are excoriations and even deep sores and ulcers from the incessant and desperate rubbing. The bare patches are less absolutely so than in ringworms, for hairs still adhere at intervals, and though the hairs may be broken they show less brittleness or tendency to split up. But the one reliable sign is the presence of the *acarus*, which may often be recognized by the naked eye when a little of the scurf is placed on a plate of glass and closely watched. The scab will be seen to move, and a little observation will enable one to detect the almost invisible insect. A low magnifying power is a great help. To find the *sarcoptes* it may be necessary to expose the skin to the warm rays of the sun, to detach a crust and tie it for twelve hours on the skin of the arm, when the *acarus* will be found in the centre of a pale red papule, and may be removed with a needle.

The *dermanyssus* may not be found on the skin unless the subject is examined in the stable at night. They are large and easily detected when bright crimson, from being gorged with blood. There is always the suspicious proximity of chickens or their dung, the latter swarming with grey acari.

The *demodex*, living in the hair follicles of dogs, causes loss of hair and prominent red nodules (acne) while the sebaceous matter squeezed from the follicles contain specimens of the *acarus*.

The *sarcoptes* of chickens attack the comb, wattles and feet, causing great irritation.

Treatment is local, though nourishing food, cool, clear air, clean, dry buildings, and the avoidance of crowding or exertion are important auxiliaries. By soap-suds, preceded if necessary by oil, break up and remove the

scabs and crusts; then apply thoroughly with a brush, oil of tar 1 oz., whale oil 20 ozs., or $\frac{1}{2}$ lb. each of tar and sulphur, and 1 lb. each of soap and alcohol. For sheep with heavy fleeces baths are very efficient. The following example will neither stain the wool nor materially endanger the sheep. Tobacco 16 lbs., oil of tar 3 pts., soda ash 20 lbs., soft soap 4 lbs., water 50 gallons. Boil the tobacco and dissolve the other agents in a few gallons of boiling water, then add water to make up to 50 gallons, retaining a temperature of about 70° Fah. This will suffice for fifty sheep. Each sheep is kept in the bath three minutes, two men meanwhile breaking up the scabs and working the liquid into all parts of the skin. When taken out he is laid on a sloping drainer and the liquid squeezed out of the wool and allowed to flow back into the bath. A second and even a third bath may be necessary in inveterate cases. For newly shorn sheep oily applications are better, being less liable to be washed off by rains. One part of oil of tar to forty parts castor oil or lard will usually suffice, but sulphur may be added if desired. The common use of mineral poisons, and especially the compounds of mercury for sheep dips, must be strongly deprecated.

In all cases an essential part of the treatment is to dress with similar agents, or with a strong solution of caustic potassa, all harness, brushes, combs and wood-work, and to subject blankets to prolonged boiling. In pastures, dress every rubbing post, tree, stump, stone, or wooden fence, or change the field.

TICKS.—IXODES.—These are common on stock in some parts of the country, and may be picked off or dressings applied as for acari.

LARVA OF GADFLY.—WARBLES.—These may be found in little rounded tumors the size of hazle-nuts, on the backs of cattle in winter and spring, each tumor having a hole in the centre, through which the grub may be seen or extracted. A several species attacks sheep as well as cattle, while a number of others in different

countries, but especially in the tropics, live in the skin of man and a variety of animals. Where gadflies abound animals are greatly terrified and injured by their attacks. The best *treatment* is to examine all cattle in spring, and squeeze out and destroy the grubs found in their backs, enlarging the opening with a knife when necessary. This cuts off the supply of flies for the coming year, and a universal practice of this might be expected to kill them out.

ATTACKS OF FLIES (DIPTERA). — MAGGOTS. — The attacks of flies are often very troublesome and even fatal to stock. Many agents, such as oil, infusions of walnut leaves, rue or wormwood, are used to drive them off, but with only partial success. To protect the heads of sheep a mixture of camphor, turpentine and asafoetida is very effectual.

Sheep suffer much in some localities from the larva of the blowfly, laid on any damp or dirty part of the skin, as on the tails and thighs when scouring. In such neighborhoods the existence during summer or autumn of a dark wet spot on the skin, of a white tuft of wool, or of wriggling of the tail, will demand immediate attention.

Treatment.—Clip off the wool and filth, pick off all maggots and apply oil of turpentine or of tar 5 oz., camphor 1 dr., asafoetida $\frac{1}{2}$ dr.; dilute carbolic acid or kerosene may be used in the absence of anything else. To prevent the attacks use the sheep dip advised for scab, or cut off the dirty wool and apply carbolic acid 1 part, water 50 parts.

SHEEP TICK.—HIPPOBOSCA (MELOPHAGUS) OVINA.— This is a dipterous insect degraded by the non-development of its wings. It is best met by the dips advised for *scab*. It is especially important to dip lambs, after affected ewes have been shorn, as the insects migrate to the young, where they find more wool to shelter them.

FLEAS.—These, like the hippoboscidae, are wingless dipteræ. We have a variety each for the dog, cat, hen

and dove, and in tropical America the *pulex penetrans* or *Chigoe* which burrows under the skin and there lays its eggs to be hatched out in the flesh. Persian insect powder is one of the best agents to dust over the animals as well as over the carpets, rugs, &c., on which they have lain ; or wash with the yolks of eggs and a teaspoonful of oil of turpentine to each egg ; or a mixture of an ounce of oil of anise-seed and ten ounces olive-oil may be rubbed over the body and washed off with soap six hours later. Sprinkle the soil where the animals roll with quicklime, carbolic acid, or petroleum ; deluge kennels and roosts with boiling water, and afterward paint the cracks with oil of turpentine ; dip mats or rugs in boiling water, and litter the buildings with fresh pine shavings.

LICE.—These are degraded wingless hemipterous insects. There are two kinds : blood suckers (*hamatopinus*), with narrow head and long trunk-like sucking-tube ; and bird-lice (*trichodectes*), with very large, broad head, and no sucking tube, but biting jaws.

Of the blood-suckers there is one species each for :—horse and ass ; horse and ox ; ox ; goat ; swine, and dog and ferret.

Of bird-lice there is a species each for :—horse and ass ; ox and ass ; sheep ; goat ; dog ; cat ; duck and goose ; two for the peacock ; three for the turkey ; four for the pigeon ; and five for the hen.

They may be safely treated by sprinkling with powdered wood ashes or by rubbing with sulphur ointment or whale-oil, with water saturated with petroleum or kerosene, or with a solution of sulphuret of potassium or lime (4 oz. to 1 gall. water). Clean the buildings, clothes, etc., as for fleas.

ERYSIPELAS.—A specific, diffuse, spreading inflammation of the skin, often involving the loose connective tissue beneath, and sometimes the internal organs, associated with fever, an unhealthy state of the blood, and usually a poison by which it may be communicated to another animal with broken skin.

Causes.—An unhealthy (septic, etc.,) condition of the atmosphere, the presence of impurities in the blood, from foul air or food, plethora, exhausting work, debilitating diseases, disorders of the liver, kidneys, or other blood-forming or purifying organ, or the absorption of putrid matters from a sore or other diseased surface. Sheep, horses and swine fed on green or even harvested buckwheat are liable, and all animals kept in close, filthy, unhealthy places, or in the vicinity of accumulations of decomposing animal and vegetable matters. Sudden suppression of an habitual discharge, heating food, and new grain and forage are occasional causes. But probably all of these do little more than lay the system open to the attack which would otherwise be escaped. More direct or exciting causes we find in local irritation—as exposure to a hot sun (newly-shorn sheep), chafing inside the elbows or thighs, the presence of rancid fats on the skin, injuries from the harness, bites of insects, etc., burns, scalds, wounds, dropsies of the limbs, and above all the keeping of patients with open sores where there is excessive emanation from decomposing organic (especially animal) matter, or the dressing of erysipelatous and healthy sores with the same sponges.

Symptoms.—There is usually a preliminary fever, loss of spirit and appetite, heat of the skin, accelerated pulse and breathing, constipation, high-colored, scanty urine, and elevation of the temperature of the rectum, soon followed by a diffuse, hot, tender, shining, itching swelling, spreading from a wound or other seat of irritation, or even on a previously healthy skin. In white skins the redness is very deep, the shade being darker according to the gravity of the case, and disappearing under the pressure of the finger only to reappear quickly on its removal. The swelling will be greater, according as the inflammation involves the skin only, extends to the connective tissue beneath (phlegmonous), or is complicated by a liquid exudation (oedematous). It shows a tendency to wide and rapid diffusion over the skin, its advancing border being always abruptly elevated from the healthy integument, though at points where it is recovering it

may subside gradually and sensibly to the healthy surface. The inflamed skin is tense and smooth, but pits on pressure and often presents vesicles on its surface. After a few days the swelling and redness may diminish, and the blisters dry up into scales, which drop off, leaving a dark, red, tender surface; or cracks may form with a sluggish, unhealthy action, and little tendency to heal. When matter forms it is liable to be diffused without any limiting membrane as in an ordinary abscess, and to lead to extensive death and sloughing of the skin and subjacent structures, or to absorption of pus and its deposit in internal organs, with fatal results.

In horses it is seen mainly about the head, chest, belly and hind limbs, and is especially liable to prove œdematous. It is distinguished from *Anthrax* and *Purpura Hemorrhagica* by the presence of the wound or sore, by the low inflammatory character of the swelling, by the greater tendency to suppuration, and the implication of the adjacent lymphatic glands.

Cattle suffer especially about the head, but also on other parts of the body. Sheep suffer mainly about the head, but often and more severely about the udder, belly and inner side of the thigh or arm, and it may be elsewhere.

Swine are mainly attacked about the head and neck, and less frequently on the inner side of the limbs, the chest or belly.

Treatment.—Open the bowels freely (horse, ox and sheep, Glauber salts; swine and dog, castor-oil,) following it up by frequent and full doses of tincture of muriate of iron, and a nourishing, easily-digested diet. In case of much weakness or with very low fever use stimulants, alcoholic or ammoniacal as they may be demanded, but never if they cause dryness of skin and rise of temperature. Diuretics may be used in œdematous cases, but in a guarded manner because of the depression. To the affected skin apply warm fomentations, by preference, with weak solutions of tincture of muriate of iron, hypsulphite of soda or sulphate of zinc. Sometimes dry applications have a good effect—as a mixture of sulphate

of zinc and starch. Iodized collodion, too, is often of service. If matter has actually formed it should be let out with the lancet, the wound being dressed with a solution of muriate of iron to prevent unhealthy action.

WOUNDS.—These are divided into *simple clean cuts (incised)*, *stabs, pricks and punctures (punctured)*, *bruised or crushed (contused)*, and *torn (lacerated)*. *Clean cuts* often heal readily when the edges are brought together accurately and retained so. But such union by *adhesion* is most probable in strong, healthy, well-conditioned animals, and least so in the weak, poor and diseased. In *fowls* it is almost invariable, in *swine* nearly equally so, in *dogs, cattle and sheep* there is still a strong tendency to adhesion, while in *horses* all wounds readily form matter and primary adhesion is exceptional. Bleeding should be checked (see *wounds of arteries*, etc.) clots washed off with a stream of tepid water, foreign objects carefully removed with fingers or forceps and the wound closed with as little exposure as possible. The edges may be stitched together by means of a curved flat needle with silk or linen, well waxed or steeped in a weak solution of carbolic acid, or better, with catgut which has been steeped for a month in oil and carbolic acid, or with silver, or other metallic wire. It may be closed by a continuous stitch as in sewing a glove, when adhesion is to be expected, or by separate stitches, a half to three-fourths of an inch apart, when primary union is more doubtful. To secure uniform approximation of the edges or pressure of the different parts, the stitches may be passed round a quill placed on each lip of the wound (quilled suture). Or pins may be passed through the lips at suitable distances, and a few fibres of tow twisted around each like the figure 8. Small wounds may have their edges shaved and layer after layer of collodion applied until the covering is strong enough to hold them together. The use of a weak solution of carbolic acid or other antiseptic agent will further favor adhesion if it can be applied without causing movement of the lips of the wound.

If the wound fails to heal by prompt adhesion, *granulations* form, covered with a thin layer of pus, and these gradually fill up the sore, leaving a scar. Or if the lips of the wound are still kept together the granulations may adhere (secondary adhesion), or finally, small sores will *scab* over and healing take place beneath.

Granulating wounds may be washed daily with a stream of tepid water, after the first three days, and may be covered with a simple dressing of tow saturated in water or oil, to which a little carbolic acid has been added. When necessarily left bare the same liquids may still be applied. When the granulations become soft, flabby and projecting (*proud flesh*), touch lightly with a stick of lunar caustic, and expose to dry air. When they become indolent and when healing and contraction come to a stand-still, apply gentle stimulants—tincture of myrrh and aloes, etc. When the deeper parts of the lips of the wound do not come in contact, pads may be applied on each side to keep them in apposition. Granulating wounds usually heal by contraction from their edges, and if this is arrested by adhesion to bones and other firm parts beneath, further healing may be impossible. In this and other cases of tardy healing, the implanting of thin slices of scarfskin, just cut with a sharp instrument from other parts of the integument, and their retention with strips of sticking plaster, will usually, hasten the process.

Punctured wounds often heal promptly, and especially in animals prone to primary adhesion, when cleansed, kept at rest, with warm dressings and pressure on their deeper parts. If inflammation occurs in the deeper parts, with suppuration, it may be necessary to enlarge the opening to allow of a ready discharge, and to let it heal outward by granulation.

Bruised and torn wounds may be treated like punctured ones, and in birds, pigs and dogs, and in the more vascular parts of the larger animals, will often heal by adhesion. Should they fail to do so, they ought to be stitched together, not too closely, and allowed to heal by granulation. Parts that are absolutely dead may be removed,

but none that continue to show signs of life, and above all, no skin that can possibly be saved.

Poisoned wounds should be promptly cauterized (See *Canine madness, Malignant anthrax, Lymphangitis*). *Subcutaneous wounds*, in which the deeper parts are injured with little or no breach of the skin, mostly heal satisfactorily, and the main object should be to secure a suitable position of the part, lest distortion should occur from undue contraction or extension of the structures in healing. For wounds that have resulted in *fistula*, see *poll evil, fistulous withers* and *quittor*. Whenever a foreign body is lodged in the wound it should be removed because of its tendency to cause fistula, especially in horses.

BURNS AND SCALDS.—The gravity of these will vary much according to their extent and depth. The treatment of the more severe is rarely desirable in the lower animals, because of the danger of fatal results from internal complications; or of ruinous distortions from the contraction of cicatrices. For slight burns apply cold water, Goulard water, water perceptibly sweetened with carbolic acid or flavored with oil of turpentine, keeping this up until the violent pain and inflammation have subsided. Success attends the exclusion of air by covering the part thickly with flour or cotton wool until irritation is past. The same end is gained by bathing the burn with oil of turpentine and afterwards covering with resin ointment. When large blisters have formed, puncture with a needle and smooth down the cuticle on the skin by gentle pressure, following up with the soothing measures already recommended. When the skin is still more deeply burned, and sloughing is inevitable, the stimulating applications (oil of turpentine with resin ointment, equal parts of linseed oil and lime-water, etc.) are still more demanded. As the sloughs separate, the detached parts should be cut off with as little irritation as possible, and when the severe irritation subsides soothing applications will be in order. Finally, the healing process will be greatly hastened by ingrafting thin slices of scarfskin, as advised under wounds.

CHAPTER XVII.

GENERAL DISEASES OF BONES, JOINTS AND MUSCLES.

Lameness, symptoms, at rest and in exercise. Diseases of Bones. Inflammation. Ostitis. Periostitis. Softening. Enlargement. Suppuration. Ulceration. Scrofulous (Tubercular) Disease of Bone. Softening and Rarefaction of Bone. Rickets. Osteo Malacia. Softening in Cows. Softening in Horses. Big-head. Fractures. Diseases of Joints. Inflammation. Arthritis. Synovitis. Ulceration. Bony Deposit. Anchylosis. Open Joint. Inflammation of Bursæ and Sheaths of Tendons. Diseases of Muscles. Ruptures. Inflammation. Fatty Degeneration. Rupture and Section of Tendons. Sprains. Thickening. Shortening. Calcification.

LAMENESS.—As the three following chapters will embrace most of the different causes of lameness, the more prominent manifestations of this failing may be here noticed.

Standing.—The patient should be approached quietly and when you are certain he is free from all exciting causes. If resting on all four limbs, the pastern of the lame one will usually be more upright than the others. One forefoot advanced eight or ten inches in front of the other suggests some tenderness of the heel or the structures in the posterior region of the lower part of the limb. Bending of the knee and fetlock and resting of the foot on the toe, without any advance in front of the other, usually implies disease of the shoulder or elbow. The advance of both fore feet, the rest being taken on the heels, and the hind limbs brought well forward under the body, should direct attention to the front of the feet. Resting of one foot more frequently and for longer periods than its fellow is suspicious.

Lying.—An inclination to lie down, and remain so, is to be similarly regarded. If the animal remains down persistently, we may infer great suffering, fractures or much weakness.

In Exercise.—Lameness may be shown in the walk, but better in the slow, easy trot, the animal being led in hand with about three feet of free rein and without noise or other cause of excitement. Some horses manifest a bridle lameness from the mere leading, but if the leader goes first on the left side and then on the right, the drooping of the head will correspond first to the one foot and then to the other, showing it to be only a feint. In all cases of lameness in a single limb the foot is rested on the ground with less weight and is raised as quickly as possible. There is therefore not only the visible halting on that limb, but a lower sound made by striking the ground and thus the ear comes to assist the eye in detecting the ailing member. If one fore limb is affected, the head and anterior part of the body are elevated when its foot comes to the ground, but drop firmly when the sound foot is planted. A depression of the opposite hind limb accompanying the elevation of the head, when the failing fore limb comes to the ground, must not lead to the suspicion of lameness behind.

In single lameness behind, the gait resembles that seen in lameness before, the haunch on the diseased side being raised when the foot is planted and allowed to droop thereafter until the opposite foot reaches the ground. In some, the elevation is the prominent feature, in others the depression, but in all the rising and falling are greater than in the opposite quarter.

With lameness in both fore limbs the step is short, the stroke on the ground weak, the rest of each foot on the ground shortened, the shoulders are carried upright and stiff, the head is raised, the loins are arched, the croup droops, and the hind limbs are brought unnaturally forward beneath the belly.

Lameness in both hind limbs is marked by the backward position of the fore feet, the short rest and weak impulse of the hind on the ground, the extension and drooping of the head, and above all the difficulty of backing.

Lameness in the two limbs on the same side determines a gait approaching the *amble* or *rack*, with the firm

planting of the opposite members. Lameness of one fore and the opposite hind produces a simple exaggeration of the gait caused by disease in one of these limbs. When the cause of lameness exists in more than one limb it is difficult to make the animal keep the trot.

In all cases it is well to have the animal driven or ridden so as to heat him, and then keep him perfectly still for half an hour to cool, before completing the examination, as many lamenesses will disappear when the subject is warmed by exercise.

DISEASES OF BONES.

These may be divided into :—*inflammation of the bone itself (ostitis)*, or of its fibrous covering (*periostitis*), which may result in *softening, consolidation or induration, enlargement, bony growths and tumors, abscess, ulceration and death (necrosis)*. Besides these there are the degenerations and diseases of bone such as *deficiency or excess of earthy salts*, with binding or brittleness of the bones ; *tubercle, cancer and sarcomatous, cartilaginous, cystic vascular or other tumors*, etc.

But the great mass of bone diseases in the domestic animals consist in inflammation and its results, to which accordingly, the following remarks will be mainly confined. Every bone is permeated even in its densest parts by an abundant network of minute blood-vessels, and studded throughout with microscopic soft elements (nuclei) which appropriate the suitable materials from the blood and build them up into the hard bony texture. If these nuclei are injured their powers of assimilation are modified, their numbers are multiplied, and they become surrounded by an excess of semi-fluid matter (lymph) with, it may be, one of the following results :—1st, the softening of the bone and the removal of its earthy salts, until it can be cut with a knife or gives way under the weight of the animal :—2d, the transformation of the lymph into pus on the surface of the bone or in its interior, where it may remain imprisoned for an indefinite length of time :—3d, the hardening of a limited

amount of lymph in the cells or inter-spaces of the bone, compressing the blood-vessels, limiting the supply of blood and favoring ulceration or even death of the part :—4th, from the above cause, or from a perversion of the plastic or assimilating powers of the nuclei, ulceration sets in on the surface or in the interior of the bone, and the bony matter is steadily removed to be replaced by an irregular excavation or a cavity filled by a bloody ichor :—5th, the swelling may completely close the blood-vessels of the bone or the inflammation may cause coagulation of the blood within them throughout a considerable portion, which accordingly dies, and has to be removed as a foreign body :—6th, short of those extreme conditions and more commonly, the exudation leads to a partial softening and general swelling of the inflamed part, and this becoming consolidated and hardened there is a material increase of size :—7th, and by far the most frequently, the inflammation affects the superficial layer of bone and its investing fibrous membrane, and the exudation, taking place between these, is soon consolidated into a layer or tumor of bone on the surface :—8th, any exudation on the outer side of the fibrous covering is also liable to be calcified and to form hard tumors, but these do not acquire the true bony texture like that formed between the membrane and the bone.

General Symptoms.—In the slightest forms of inflammation there may be little or no lameness, though usually there is a halt on the affected limb when trotted on a hard surface. The affected portion of the bone is tender to pressure or percussion, and is the seat of swellings at first soft and yielding, but later hard and resistant. In the severer forms the bone itself is softened, extensive exudation of lymph takes place around it, and the investing soft structures become the seat of violent inflammation and swelling ; lameness is then extreme. In the slighter and chronic cases there is no disturbance of the general health, but in the more acute and severe, intense and even fatal irritative fever may come on.

When suppuration takes place in the interior of a bone the matter may remain imprisoned indefinitely, the spot

being marked by a general increase of the bone, and lameness persists. If suppuration takes place between the bone and its fibrous covering the danger is even greater, for the matter is liable to separate the bone and membrane, producing further inflammation or ulceration, or even death of the bone—the supply of blood being cut off. The superficial abscess is to be detected by its fluctuation beneath the fingers, as in abscess of soft parts.

Ulceration may result from pressure of matter, etc., or from exposure to the air. If without external opening, it is not easily recognized, but there is lameness and tenderness, with little alteration of the surface of the bone, or the presence of slight bony deposits alternating, it may be, with soft open spaces. If the ulcerated bone is open to the air, it is found to be softened in texture, breaking down readily under pressure of a probe, and in the centre of the ulcerous cavity rounded bony deposits are felt, as evidence of an effort at repair. The discharge is then ichorous, and abounds in gritty particles and earthy salts. If this discharge has commenced to decompose it smells badly.

Death of the bone is always associated with an open sore discharging a very foetid ichorous fluid, with gritty particles and the power of rapidly blackening silver. If probed the hard bone is felt without any fibrous covering, and if seen this is black, yellowish, white, or of some allied shade and without any of the pink aspect of healthy bone.

General Treatment of Inflammation in Bone.—Unless in the very mildest cases, the first object is to check the inflammation by soothing measures. A purgative is usually desirable. Rest is indispensable. Whenever possible, such a position should be given to the part as will obviate pressure, weight, or gravitation of blood toward the disease. Soothing local measures, such as fomentations with warm water; a thick wet bandage covered with dry; the persistent application of cold water, by continuous showering of the part, the water being brought from a bucket placed at a higher level, by means of an elastic tube fastened to the body; in certain

cases ice-bags may be applied ; or cooling astringent lotions, such as vinegar and salt ; acetate of lead $\frac{1}{2}$ oz., vinegar 2 qts., carbolic acid 60 drops, etc. This may have to be kept up from five to fifteen days. When heat and tenderness have subsided, counter-irritants are to be used. In slight cases rubbing with compound iodine ointment, or with a mixture in equal parts of liquor ammonia and olive-oil, may suffice. In others we must use active blisters, such as Spanish flies 2 dr., camphor 5 grs., alcohol 5 drops, lard 1 oz. Or a drachm of the Spanish flies may be replaced by a drachm of iodide or biniodide of mercury. In either case the hair should be cut off and the ointment well rubbed in for several minutes against the direction of the hair. The animal's head should be tied short for twelve hours, to prevent gnawing of the part and blistering of the lips. After this the surface is to be smeared with lard, daily, until the scab drops off. In still other cases the hot iron may be demanded. It should be applied in points, each application being very temporary, to avoid the effect of radiated heat on the adjacent skin. The usual distance between the points is from $\frac{1}{4}$ to $\frac{3}{4}$ inch, and the depth will vary in different cases. When the irritation from the hot iron has passed off, blisters may be applied if necessary.

In all cases the use of counter-irritants must be stopped and soothing measures resorted to when it becomes evident that active inflammation has been set up anew in the bone. A long period of rest is essential to allow of the hardening of the newly-formed bony tissue or of the old bone which has been softened or otherwise altered by disease.

Matter forming in the interior of a bone is to be evacuated by boring down to it with a circular saw (trephine). Matter forming between the bone and its investing membrane must be promptly evacuated with a sharp knife or lancet.

Simple ulceration is to be treated like an ordinary wound, the pressure or other cause of its existence having been first removed. A nourishing diet and a course of tonics (chincona, gentian, etc.,) are usually demanded

A *dead bone* should be removed. If a simple scale or film on the surface, it may be taken off with a sharp knife or chisel. If larger the bone-forceps or saw may be necessary. It may sometimes be needful to remove a piece of live bone with the circular saw, to make way for the extraction of a dead portion imprisoned within. Should the outer fibrous covering of the bone be preserved intact, new bone may be formed in place of the old, but never so perfect in form, and, as a rule, the extensive loss of an important bone, in one of the lower animals, renders it useless and should warrant its destruction.

In no case should a cutting operation on a bone be undertaken while the soft parts around it are in a state of acute inflammation, as, although the diseased or dead parts should be removed, the adjacent bone is likely to take on unhealthy action and to prove worse than at first.

In case of new bony deposits and tumors, it is rarely desirable to resort to cutting instruments, unless when they have a broad mass and narrow neck connecting them to the parent bone. In this case they can be laid bare and removed with bone forceps or chisel. Other forms are best left to nature after all unhealthy action has been subdued, and will materially diminish when preserved from hard work, strains, jars and all excitants to renewed growth. When continuous gentle pressure can be applied without irritation it greatly favors absorption. In some instances the distension of the fibrous membrane covering a bony swelling is the main cause of continued inflammation and lameness. This is to be met by dividing the membrane with a narrow-bladed knife inserted to one side of the swelling, much care being requisite to avoid entrance of air, injury to joints, etc.

• SCROFULOUS (TUBERCULOUS) DISEASE OF BONES.—This is mostly seen in young animals when the bones are soft and growing rapidly, and may be suspected when the patient comes of a tuberculous family. It will attack any part, but is especially common in the lower part of

the limbs, and is one form of "*foul in the foot*." It attacks the ends of long bones or the whole bulk of short ones, those parts, in short, which have an open cancellated texture. The interspaces of the bony tissue fill up with gelatinoid lymph, which may or may not pass into the yellow cheesy tubercle, and similar changes take place on the surface, long outgrowths appearing, the interstices of which are filled by the same product. Ulceration ensues, sores form in the skin, discharging an unhealthy matter, the softened bony tissues may be felt breaking down under a probe, and the ends or processes of the bones may be found detached from the shaft or mediar part.

There may be coexisting tubercle in the lungs, bowels etc., with cough, expectoration, diarrhoea, etc., and sometimes in young animals the navel remains open and the urine dribbles from it continually.

Treatment is hardly advisable, as tuberculous animals are undesirable alike for breeding or for human food. It consists in securing a good nurse, well fed on grain as well as fodder if the patient is young, or good feeding if beyond this stage. Lime-water in the sucking, and in all subjects tonics (phosphate of iron, hyposulphite of iron, cinchona, cod-liver oil, pancreatine, etc.)

SOFTENING AND RAREFACTION OF BONE.—RICKETS.

Young animals (puppies, sheep, calves and, less frequently, foals,) often suffer from an imperfect nutrition of the bones, with a deficiency of earthy salts, so that the bones, especially those of the limbs, bend under the weight of the animal and assume various unsightly distortions. The affection runs hereditarily in certain families, and its appearance is often determined by insufficient, excessive, or injurious food, such as poor, sour or fevered milk or inadequate substitutes. Anything that undermines the general health will develop it in a predisposed subject. The malady may usually be checked by a change to rich or moderate feeding, as the case may demand, a dose of pepsin wine at each meal, with dry, warm, airy sleeping places and access to open air, sun-

shine and gentle exercise. Puppies may have bones to gnaw at will. In cases of severe threatened distortion much benefit may be derived from support by well-padded bandages.

SOFTENING OF BONES IN DAIRY COWS.—This resembles rickets its dependence on the nature of the food, but appears only in breeding cows. It is a disease of poor, sandy and gravelly soils, the vegetation of which is deficient in earthy salts, and even on these is shown only after a dry season when fodder is at its worst. Diseases of digestion and assimilation will also, exceptionally, determine it. The parts that primarily suffer are the bones of the haunch, the disease resembling in this respect the *osteo malacia* of women who have borne children.

Symptoms.—Lameness, difficulty in rising, with some alteration of form in the quarters are the first signs, and an examination of the pelvic bones by the oiled hand introduced through the rectum will detect a want of symmetry on the two sides, from bulging, irregular swellings at different points. In more advanced stages the bones break and crumble under the body's weight, and the animal remains constantly down, unable to rise. A depraved appetite and a tendency to eat all sorts of unnatural objects, though a common symptom in breeding cows, is excessive in many of these cases, and the patient mostly loses flesh rapidly, though some will remain fat for a length of time.

Treatment.—Change the locality to one with a richer fodder, or bring the wholesome fodder to the animals, and add, liberally, grain (barley maize, oats, beans,) from sound localities. Fresh air, sunshine and dry resting places are all important. Avoid breeding again until health is fully established, or better, fatten for the butcher.

FRACTURES.—These are *simple* when a bone is broken across; *comminuted* when broken into several pieces; and *compound* when the soft parts are torn so as to establish a communication between the broken ends

and the external air. The two last are extremely dangerous, but the first is more hopeful. Simple fractures, however, vary in gravity according to their kind. Thus in the very young the break is liable to be imperfect, with a number of pointed processes locking into each other (*greenstick fracture*), and as the ends are easily and accurately replaced and the bones soft and vascular, repair is prompt and perfect. In others the break is directly and smoothly across, or with indentations and processes, so that when the ends are placed in apposition they cannot slide past each other; these too are easily repaired. A third class are broken obliquely or with a bevel, so that the broken surfaces slide upon each other under the contractions of the muscles, and the sharp ends are continually jerked into the soft parts around. The continuous movement prevents union, and the irritation of the soft parts sets up inflammation, so that such fractures may prove as troublesome as the *compound*.

Symptoms.—Disuse of the affected bone, distortion of the part, shortening, if it is the main bone of the limb, trembling of the muscles over the injury, a grating sensation conveyed to the hand on moving the broken bone, unnatural mobility of the part, and the suddenness of the injury from a wrong step or some mechanical violence. In cracks and partial fractures of bones, with a strong investing fibrous membrane, there may be no displacement, increased mobility nor grating, but only a tender line across the bone with or without a slight elevation.

Treatment.—The first thing to be done is to bring the broken ends into correct apposition, and retain them there by splints and bandages. No matter if the soft parts are inflamed and swollen, to leave the sharp ends jerking into them with each contraction of the muscles, will only make matters worse, whereas the removal of this source of irritation will usually entail immediate improvement. If from the oblique or comminuted nature of the fracture the bones cannot be so placed and retained, recovery need not be expected, at least without distortion. To bring the ends together accurately, it may be necessary to employ extension and counter-extension

A strong sheet or blanket is crossed over the inside of the upper part of the limb and held to keep the body still ; while extension is affected by lines attached to the foot, a block and tackle may be used, but cautiously, in view of the increased power thereby obtained. It may even be needful to relax the muscles by placing the animal under the influence of ether, chloroform or chloral-hydrate. When the limb is being extended, the operator brings the broken ends together correctly, and splints are applied.

These may be made of sheets of gutta-percha softened in warm water and applied so as to adapt themselves to the inequalities of the limb ; of strong pasteboard with the edges torn (not cut) and softened in water to allow of its being moulded to the surface ; of starch bandage, a long cotton bandage three inches wide, laid on accurately, layer after layer, and starched as applied, so that it dries into a perfectly fitting and hard resisting case ; a plaster bandage, consisting of a long roll of the same kind, with plaster of Paris thickly dusted between its layers, and the whole dipped in water before it is applied ; or pieces of sheet-iron carefully padded to prevent chafing and secure perfect adaptation, and bound firmly by a surface bandage ; or wooden splints may be fashioned to the form of one side of the limb and applied with a sufficient internal padding. It is usually needful to apply one of these wooden or iron splints outside the starch or gutta-percha cases, in the larger animals, to give the requisite solidity. In all cases the limb should be accurately wrapped in a long narrow strip of cotton or linen as a protection before the application of the bandage proper. The bandage should always extend to the extremity of the limb (hoof or claws), otherwise the uncovered portion will swell, inflame and perhaps die. It should not only fix immovably all the joints below the fracture, but if possible the next above as well, as by this means, as well as by the enforced immobility of the muscles, the perfect rest of the broken ends is secured.

If swelling existed before the application of the band-

age, it may become loose in a day or two, and should be reopened and more accurately applied, care being taken to secure equal pressure from the extremity up. The starch bandage may be slit open up the side, and when properly padded reapplied with the one edge overlapping the other as far as necessary, and fixed by a long bandage applied over all. The plaster bandage may be adapted by filling up the interval between the soft skin bandage and the plaster case with a thin pulpy mixture of plaster of Paris and water poured in at the top.

The limb should be kept in the bandage for a month or six weeks, and will require a rest of two or three months more, for the consolidation of the new tissue, before being put to work.

Fractures in the upper parts of the limbs of quadrupeds, which it is impossible to fix by bandages, may yet recover with very little shortening or distortion if the break is transverse. Fractures of these parts and of the ribs recover with a considerable enlargement around the seat of the break, which may be afterwards absorbed in part or in whole, as the bone is consolidated. The same holds good of fractures of other parts when movement is allowed between the divided ends during recovery.

Slings.—For large quadrupeds with broken limbs *slinging* is absolutely essential. The simplest mode is the following: Four strong posts are fixed to the ground and roof, so as to form an oblong, inside which the four feet of the animal may stand. A strong horizontal bar is then fixed to the two posts on each side, at such a height as to correspond to the middle of the body. Then the animal being walked into the frame, a horizontal bar is fixed between the two front posts so high as to cross the lower part of the neck, and another between the two hind posts at about the height of the stifle. Next a strong sheet (new sail cloth is best) is fixed to the one side bar by being wound round and nailed at the outer side, and having been passed beneath the body, is fixed to the opposite side in the same way. It must be just sufficiently far back to clear the fore limbs, and just so loose as to allow the patient to stand over it without

pressure or chafing, or to settle himself into it at will. In the male, care must be taken to have it narrow enough not to cover the sheath.

It is often necessary to allow an animal to become fatigued by standing for a day or two before being put in a sling, otherwise he may be very irritable at first. Care must be taken not to let him feel the sling beneath him until it is ready to be fixed, as many patients will settle down into it the moment it is felt.

DISEASES OF THE JOINTS.

Here in addition to bone we have gristle, fibrous tissue (capsular and binding ligaments) and synovial membrane, a thin vascular structure which secretes the albuminous glairy fluid known as joint-oil.

INFLAMMATION.—ARTHRITIS.—SYNOVITIS.—Here at the most common lesion is inflammation, from which most of the others follow as consequences. This may begin in the bones as a result of concussion, blows, etc., and extend through the cartilage and ligaments to the synovial membrane; or it may originate in the ligaments as a consequence of sprains or other injuries; or in the synovial membrane from wounds opening the joint and exposing it to the air; or it may be a local manifestation of some constitutional disease such as rheumatism, tubercle, glanders, farcy, etc., or finally it may be due to plugging of the blood-vessels in consequence of pus, ichor, or fibrinous clots washed on through the vessels from some distant seat of disease. In all cases the whole of the joint structures tend to be involved and the symptoms are similar.

The succession of changes may be as follows: the inflamed synovial membrane throws out a serous fluid filling the joint to excess; the ligaments and adjacent connective tissue also throw out a semi-liquid exudation which forms a yielding swelling around the joint, susceptible of indentation with the fingers; the cartilage covering the ends of the bones softens and is changed into

a fibrous material or is even absorbed, leaving the bone bare ; the bone exposed in this way may ulcerate, if that has not previously commenced, or it may be partially repaired by the deposit of a dense ivory-like layer (eburnation), the smooth glistening surface of which glides smoothly on that of the opposite bone ; lymph may be exuded from the exposed surface of the bone and from the interior of the synovial membrane, and this, as well as what is outside the joint, may be developed into fibrous tissue restricting the movements of the joint, or more frequently into bone which binds the bony structures together and abolishes all movement (*stiff-joint, ankylosis*,) ; in very severe cases the lymph inside and outside the joint degenerates into pus, and this makes its way through the tissues to the surface, is discharged and leaves an open joint, which soon determines a further increase of the inflammation and destructive changes. In tuberculous diseases of the joints there is the softening and enlargement of the ends of the bones, a gelatiniform exudation, and its cheesy degeneration ; in rheumatism there is little tendency to suppuration ; in glanders, farcy, plugging of vessels, etc., there is the specific deposit or an early suppuration.

General Symptoms.—The joint is swollen, tense, and elastic, is kept partially bent, is hot and tender, the parts around it may retain the indentation made by the finger, and the suffering is greatly increased when the joint is moved. There are all grades from heat, tenderness, swelling, and habitual flexion of the joints, with the capacity of working off the lameness during exercise, to severe forms in which no weight can be thrown upon the limb, and the attendant fever is so intense that appetite is gone, thirst is ardent, breathing and pulse greatly accelerated, the heat of the body raised to a high point, and the patient may die from the constitutional excitement.

When suppuration takes place there is an aggravation of all the symptoms, with frequent shivering, and the gradual absorption of the soft parts renders the fluctuation more and more evident up to the period of rupture.

Preceding stiff-joint there is a long period of sub-acute inflammation, the joint being kept immovable by the pain and the abundant exudation, until ossification ensues.

Tuberculous disease of the joints occurs in young animals, the offspring of consumptive families, and is marked by the enlargement and softening of the ends of the bones, the formation of wounds or ulcers, and, it may be, disease of the lungs or bowels.

Rheumatic disease is characterized by its tendency to move from joint to joint or muscle, by its aggravation under the influence of cold and damp and improvement under warmth and sunshine, and by its indisposition to suppuration. Glanders, farcy, plugging of the vessels, etc., are distinguished by the presence of the coexisting disease in other parts.

General Treatment.—In severe cases secure immobility in the joints by placing in slings, and, if necessary, by the application of a smart blister around the articulation. In the absence of the blister apply cooling or soothing lotions as for inflammation of bone, and follow this up by blisters or firing when the inflammation has in the main subsided and the heat and tenderness disappeared. In the slight, subacute and chronic forms the counter-irritants may be applied at the first. When ankylosis threatens it is sometimes advisable to favor it by active blistering and rigid immobility of the joint. If ulceration of the joint surface occurs the hot iron usually gives the best results. If suppuration has ensued the pus must escape by an external opening, and our efforts must be thereafter directed to limiting the inflammation as far as possible and obviating death by the general fever, or uselessness, by the destruction of the joint.

In the severer forms a purgative should be given at the outset, and this may be followed by a soft laxative diet (mashes, roots, green food,) and diuretics, (carbonates or acetates of potassa or soda, colchicum, etc.,) especially when there is reason to suspect any rheumatic complication. In some cases of this, as of bone disease, in which there is imperfect assimilation and the passage of an

excess of phosphates in the urine, a course of bitters and iron tonics is demanded.

Tuberculous disease of the joints demands similar treatment with due attention to the general health to correct, if possible, the unhealthy state.

OPEN JOINT.—This results from an incised, punctured, lacerated or contused wound, and will vary in gravity according to the nature of the wound and the certainty of inflammation ensuing. If there is a simple minute puncture or cut, the wound may close without this result, but if the tissues are severely lacerated or bruised, as in case of falls, etc., a certain amount of inflammation must necessarily ensue.

Treatment.—Never probe such wounds. Sand or gritty matter must be removed by a stream of tepid water or the most careful picking, and the lips of the wound brought together if necessary by stitches, but with as few as possible, and those only passing through the skin. Perfect quiet must be secured by slings, splints, bandages, or, if the opening is small, by a blister enveloping the joint, but leaving a clear space of an inch around the wound. In the absence of the blister, the joint may be irrigated with cold water continuously applied as for ostitis, or a poultice may be applied with a weak solution of carbolic acid poured over its surface, or the same carbolic lotion (1 part to 100 water) may be applied by means of saturated cotton bandages covered with dry. Coagulating agents (powdered alum, acetate of lead, sulphate of zinc, etc.,) are sometimes used to close the wound by a clot of synovia, and if this has been effected it should never be disturbed by picking or dressing, but left to be expelled when the wound is finally closed by the growth of granulations from its lips. The greatest danger lies in the movement of the joint which stimulates the secretion of synovia and keeps the wound open; in the introduction of atmospheric air into the joint, and in the decomposition of the morbid liquids in the wound. Hence, perfect rest, closure of the wound and the use of antiseptics like carbolic acid, are all important.

The general treatment is the same as for anthritis from other causes.

If suppuration ensues there is the greatest danger of destruction of the joint.

INFLAMMATION OF THE SYNOVIAL CAVITIES.—
BURSÆ AND SHEATHS OF TENDONS.—*Bursæ* are little synovial cavities placed between the skin and prominent bony processes to favor the gliding of the one on the other. *Thcæ* are similar sacs interposed between bones and fibrous cords (tendons, ligaments,) or between two such cords, to favor gliding. Each may be the seat of inflammation with its consequences—over distension from excessive secretion of serum :—exudation of lymph, with thickening, induration, adhesion, calcification of the walls, or with suppuration.

It may be developed by wounds, punctures, cuts, bruises, sprains or rheumatism, and is manifested by heat, pain, tenderness and an elastic swelling (wind-puff, wind-gall,) the enlargement usually remaining after inflammation has subsided. This condition, as well as induration or calcification of the walls, causes material deformity. Suppuration is evinced by a great increase of the heat and tenderness, with a more distinct and superficial fluctuation and a surrounding engorgement, which pits on pressure.

Treatment consists in rest, a relaxed posture of any tendons implicated, and soothing, cooling or astringent applications, as in the early stages of sprains or ostitis. A purgative and restricted diet are equally necessary. When heat and tenderness have subsided a small blister (see periostitis) will often cause absorption of the liquid, or it may disappear under pressure maintained for two hours at a time, twice daily at first, and increased by two hours daily; or finally, the liquid may be drawn off by the nozzle of a hypodermic syringe, and the sac compressed with a bandage (and, if necessary, pads) saturated in an astringent cooling lotion. After evacuating the liquid an injection of compound tincture of iodine 1 part, water 2 parts, may be thrown in and expressed again

after three minutes, the part being afterwards covered with wet bandages.

For suppuration a simple subcutaneous bursa may be laid freely open and allowed to heal by granulation, or a thread may be drawn through the cavity and the pus drawn off, while cooling lotions are applied to the surface.

DISEASES OF MUSCLES.

RUPTURE OF MUSCLES.—The red flesh is rarely torn in life and never by voluntary contraction. Though torn across with ease after death, it will resist much more during life than the white fibrous cord by which it is attached to the bones. Muscles are usually torn by some extreme involuntary contraction, as in recovering from a wrong step or slip, or in the extreme contractions of lock-jaw. Rupture is recognized by the sudden pain and inability to use the muscle, and, if it is superficial, by tenderness, by a depression in the seat of the tear, and a bulging of the muscle above and below it. Later the depression may be filled by a soft compressible clot.

Treatment consists in the approximation of the divided ends by such a position as will relax the muscle, and by a tight bandage from the foot up if it be in a limb.

INFLAMMATION OF MUSCLE.—This is usually the result of rheumatism, but may arise from continued use or from local injury. It is manifested by swelling and extreme tenderness of the muscle in question, with loss of contractile power. If rheumatic it has the further characteristic of shifting from place to place. It may result in abscess, or thickening of the fibrous investing membrane, or in calcareous, granular or fatty degeneration. It must be treated by rest, with soothing local treatment like any ordinary inflammation, and matter may be evacuated with knife or lancet, but the degeneration may be looked upon as permanent.

Fatty degeneration is common in overfed animals, above all in those bred for early maturity and great aptitude to fatten (improved cattle, sheep and pigs,) and it is quite

irremediable. It may also arise from paralysis, the result of injuries to the nerves, as in roaring.

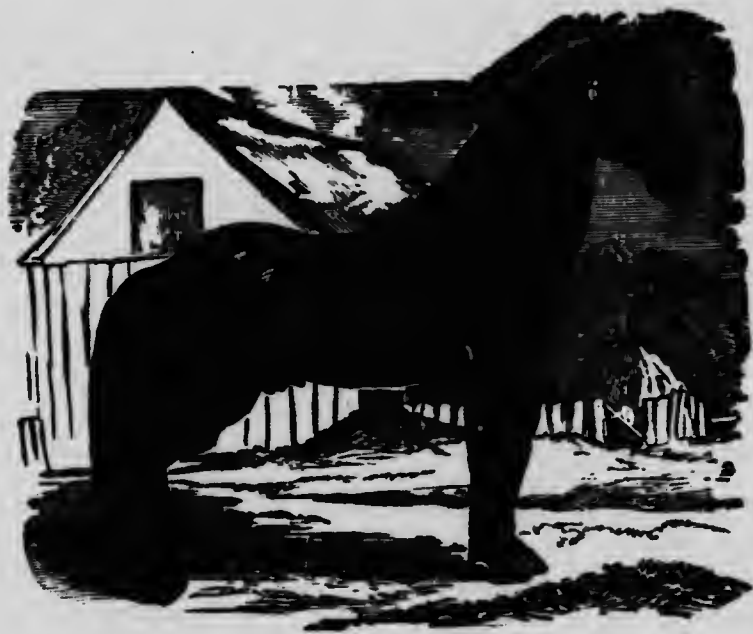
RUPTURE OF TENDONS.—SECTION OF TENDONS.—

These are not uncommon in horses during severe exertions, as on the race-course, the back tendons being the most common seat of the injury. Whether torn across or divided with a cutting instrument, they are readily repaired by the exudation of lymph between the divided ends and its organization into white fibrous tissue. It is necessary to support the limb so that the divided ends may be placed in apposition and retained thus for three or four weeks. Inflammation is to be checked by ordinary means.

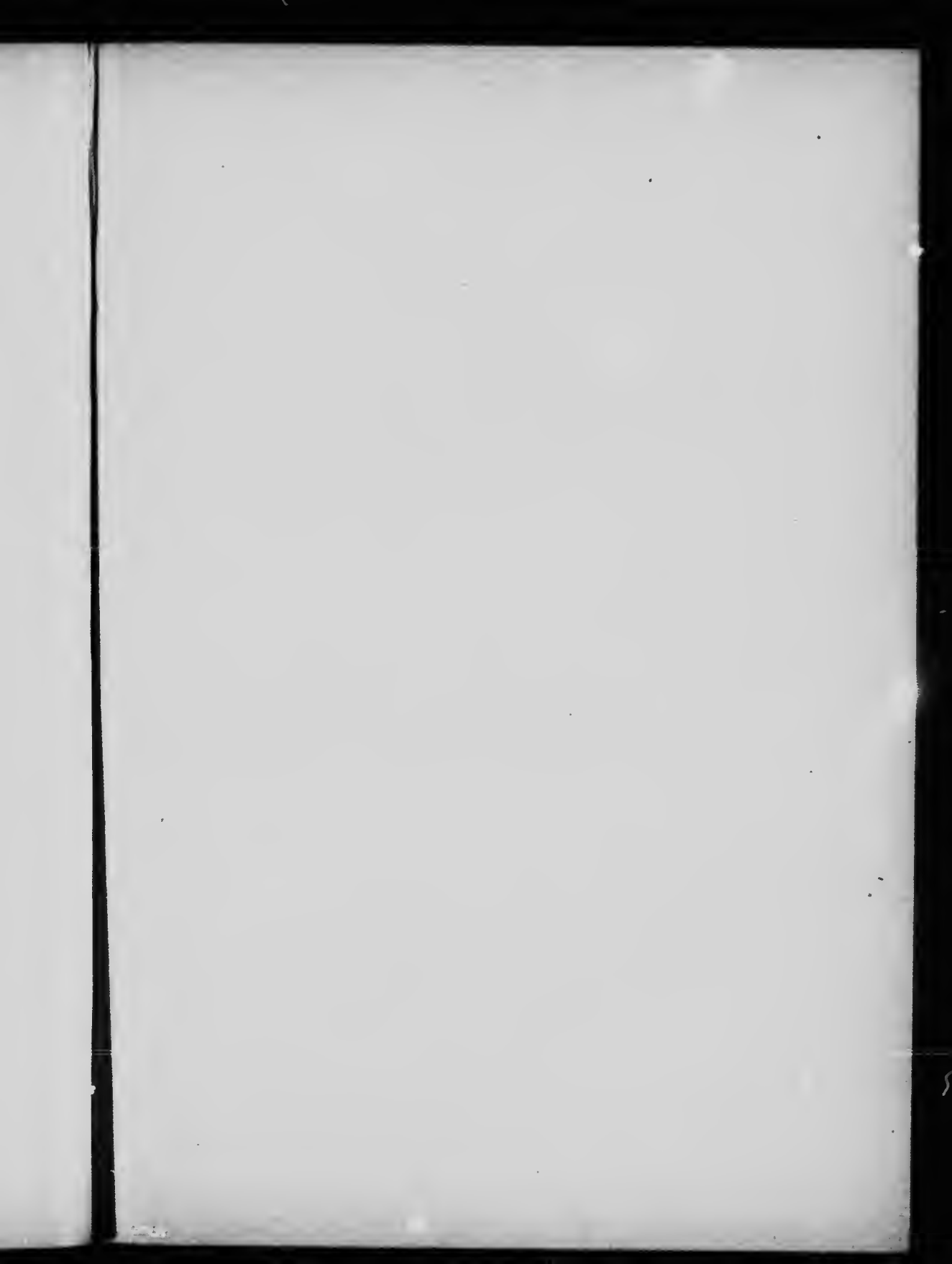
SPRAINS.—When subjected to over-exertion, sinews become the seat of sudden severe pain, inflammation, exudation, thickening and shortening. Sprains occur mainly from severe and continued over-exertion, or from the sudden jerk consequent on taking a wrong step when fatigued and unable readily to recover the balance. They are most frequent where tendons play over a bony process, but may occur at any part, and are of all grades from those producing a slight halt, with almost imperceptible thickening of the tendinous cord, to those in which the cord has been extensively torn and becomes the centre of a most violent inflammation.

Treatment.—When violently inflamed or the seat of extreme pain, the tendon should be rested and relaxed by giving a suitable position to the limb, and fomented with warm water or showered continuously with cold, until heat and tenderness have been subdued. Or cooling astringent lotions may be used as advised under ostitis. A laxative and cooling diet are often essential. When heat and tenderness have subsided, occasional showering with cold water and hand-rubbing, or stimulating liniments (camphorated spirit ; liquor ammonia 1 part, olive oil 2 parts ; camphorated spirit and peppermint water equal parts, etc.,) may be used. The same agents may be applied to very slight cases at the outset. Or blisters may be applied as advised under ostitis.

THICKENING, SHORTENING, CALCIFICATION OF TENDONS.—These are the results of severe or repeated sprains. If slight they may be benefited by time, gentle exercise (at grass), and an occasional blister of iodide of mercury. In cases with such thickening and shortening as to impair usefulness, after all inflammation has subsided the tendons may be cut across by a narrow-bladed knife, making an almost imperceptible skin wound, the ends drawn apart by full extension of the limb, and the case treated like an accidentally ruptured or cut tendon. If this operation is performed in a warm season, antiseptics must be applied to the wound.

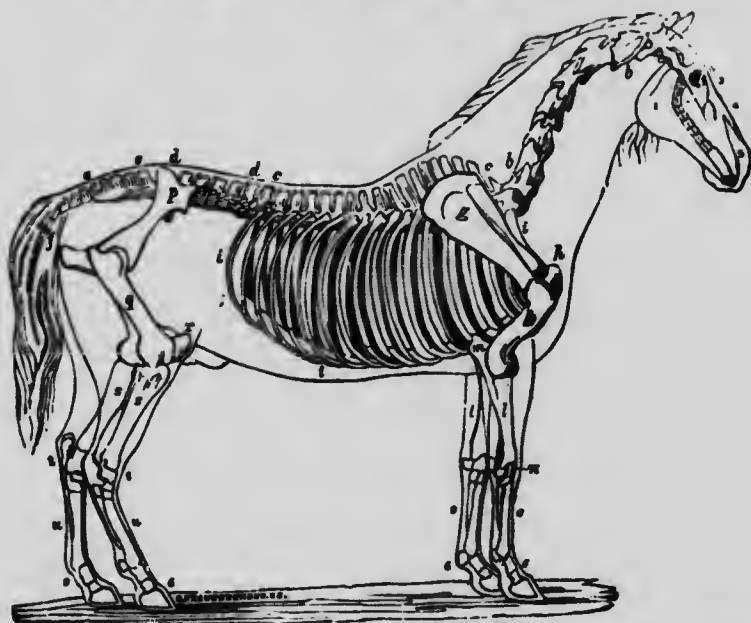


THE CANADIAN HORSE.





NAMES OF THE EXTERNAL PARTS OF THE HORSE.



NAMES OF THE BONES OF THE HORSE.

- | | | |
|--|--|--|
| b. Seven cervical vertebrae or bones of the neck. | f. caudal vertebrae or bones of the tail. | o. Metacarpal bones. |
| c. Eighteen dorsal vertebrae or bones of the back—the seat of Fistula. | g. Shoulder. h. Breast. i. Ribs. | p. The haunch, consisting of the ilium, the ischium and pubis. |
| d. Six lumbar vertebrae or bones of the loins. | l. Radius—Upper bones of the fore-leg. | q. Femur or thighs. |
| e. Five sacral vertebrae or bones of the haunch. | m. Ulna or Elbow—Seat of elbow tumor. | r. Stifle joints—seat of Stifle-out. |
| | n. Carpus or knees—Seat of splint or splint. | s. Tibia or leg bones. |
| | | t. Hocks having six bones—the seat of Spavin. u. Splint bone. |
| 1 and 2 Jaw bone, 3 and 4 Skull and face, the seat of Big-head. 6 Pastern, seat of Ringbone. Hind pastern. Smaller hind pastern. Fore-pastern. Smaller Fore-pastern. | | |

CHAPTER XVIII.

SPECIAL INJURIES OF BONES, JOINTS AND MUSCLES.

... of the lower jaw. Injuries by bit and curb. Fracture of the upper jaw; of the bones of the nose; of the frontal bones; of the crest of the poll; of the base of the cranium. Dislocation of the lower jaw. Open Joint between upper and lower jaws. Cancer (Encephaloid) of the Orbit. Tooth-like tumors under the ear. Poll Evil. Fistulous Withers. Fractured Processes of the neck-bones. Broken neck. Fracture of the Spinous Processes of the back and loins. Sprain of the back or loins. Transverse fracture of the back or loins. Broken back. Laceration of the muscles beneath the loins. Fracture of the croup. Injuries to the bones of the tail. Fractured Ribs. Wounds penetrating the chest. Shoulder lameness. Tumors on the shoulder. Sprain of the Coraco-radial tendon. Shoulder-sprain. Sprain of the muscles outside the shoulder-blade. Disease of the shoulder-joint. Other affections of the shoulder. Affections of the elbow and arm. Tumors on the point of the elbow. Wounds of the elbow. Fracture of the point of the elbow. Disease of the elbow joint. Fracture of the arm bone. Fracture of the fore-arm. Sprain of the radial ligament. Sprain of the back tendons behind the knee. Thorough-pin of the knee. Synovial swellings in front of the knee. Inflammation of the knee. Dislocation of the knee. Wounds of the knee. Speedy cut. Broken knees. Splints. Sore shins. Fracture of the splint bones; of the shank-bone. Sprains of the back tendons; of the suspensory ligaments. Wind-galls. Sesamoiditis. Sprain of the inferior sesamoid ligaments. Elastic swellings in front of the fetlock. Cutting. Bruises on the fetlock. Fracture of the pastern bones. Bony growths on the pastern bones. Ringbones. Sprain of the flexor tendons behind the pastern. Fractures of the hip-bones; of the outer angle; of the inner angle; of the point of the hip; through the shaft of the bone; into the joint. Sprain of the hip. Displacement of the Abductor Femoris. Disease of the hip-joint. Dislocation of the hip. Fracture of the thigh-bone; the neck; the shaft; the lower end. Fracture of the knee-cap. Dislocation of the knee-cap, stifled. Disease of the stifle. Fracture of the leg between the stifle and hock; Tibia; Fibula. Sprain or laceration of the muscle which bends the hock. Sprain of the hamstring. Rupture of the hamstring. Capped hock. Displacement of the tendon playing over the point of the hock. Sprain of the flexor tendon behind the hock. Thorough-pin. Distension of the sheath of the extensor

tendon in front of the hock. Fracture of the inner malleolus. Fracture of the point of the hock and other hock bones. Bone spavin. Inflammation of the true hock joint. Bog spavin. Dropsy of the hock joint. Blood spavin. Curb. String-halt. Other causes of lameness.

FRACTURES OF THE LOWER JAW.—These take place in the anterior part occupied by the front teeth, or more frequently on one side, between these and the grinders. In simple fractures with no great tendency to movement an exclusive diet of soft mashes will often suffice, a double halter being so arranged that the animal cannot possibly reach either fodder or litter. If the fracture is between the front teeth a copper or silver wire wound round two teeth on opposite sides of the break may fix the parts sufficiently. If further back and very mobile, it may still be retained at times by using the tushes as fixed points from which to carry the wire. Where these cannot be availed of, the jaw may be perforated by a fine drill in front of the fracture and behind it, and the two parts firmly bound together by a silver wire. If this is not available, a mould of gutta percha or wood is made to fit the lower jaw and sides of the face from the throat as far as the chin, and this is strapped on by four belts, one passing behind the ears, one in front of them, one on the middle of the face, and one on the nose but four inches above the nostrils. The straps may be held together by another or a simple cord passing down the middle of the face, and the two lower ones should be slightly elastic. This should be kept on till union is effected, and no hard food should be allowed for two months.

In cases of compound comminuted fractures remove all foreign bodies and detached pieces of bone, and make an opening in the case, through which the wound may be dressed with antiseptic liquids (carbolic acid 1 part, water 100 parts).

INJURIES BY BIT AND CURB.—These often cause slight fractures or superficial necrosis on the upper or lower borders of the jaw. Extract detached pieces or

scrape off dead, and when the wound has healed drive with a snaffle.

FRACTURE OF THE UPPER JAW.—This is much less serious. If at the anterior part fix by wiring the teeth together. If further back, and associated with discharge from the nose, trephine the sinus (see diseased teeth), remove detached pieces of bone, and inject with a weak astringent solution (diseased teeth).

FRACTURE OF THE BONES OF THE NOSE.—Here the depression of the space between the nostrils and the difficulty of breathing are characteristic. Shave the skin above and below the fracture; make a smooth cone of wood, rounded at the apex, and just large enough to fit the nasal passage; with this inside the nose raise the bone to its proper position, and strap it there by strong adhesive plaster passing over the interval of the fracture. In obstinate cases we can resort to plugging of one nostril with tow, or of both nostrils if tracheotomy has been first performed.

FRACTURE OF THE FRONTAL BONES.—If beneath the level of the eye the danger is slight and after removal of detached pieces of bone it may be treated like an ordinary wound. If above, the depressed bone must be raised with a lever to avoid compression of the brain when exudation takes place. Fracture of the process which forms the upper boundary of the eye-socket, may be raised in the same manner to avoid subsequent blemish.

FRACTURE OF THE CREST OF THE POLL (OCCIPITAL)—If split straight down and without opening the cranium and exposing the brain, the animal should be tied so that the nose is kept habitually protruded and the injury treated like a simple wound. It may be needful to use astringent lotions, or even to make a counter-opening below to secure a perfect recovery.

FRACTURES AT THE BASE OF THE CRANIUM.—These are usually due to blows on the poll, the shock being conveyed through the harder structures, and expended fatally on the softer bones below. Being in contact with the most vital parts of the brain, and beyond the reach of surgical interference, such fractures are fatal.

DISLOCATION OF THE LOWER JAW.—This sometimes occurs in the dog from opening the jaws too widely in giving pills, etc. The jaw is slightly advanced and held open in spite of all attempts of the animal to close it. Wrap the thumbs very thickly in cloth, and seizing the lower jaw press it forcibly downward and backward, when it will slip ~~in~~ with a jerk and the jaws will close firmly.

OPEN JOINT BETWEEN THE UPPER AND LOWER JAWS.—A wound exists midway between the eye and the root of the ear, discharging a glairy fluid when the animal chews. Fix the jaws by a bridle with straps drawn tightly around the nose, feed thick gruels and soft mashies only and treat as advised for open joint.

CANCER (ENCEPHALOID) OF THE ORBIT.—This occurs in horses and cattle, great, angry, bleeding, fungous growths, appearing from the soft and hard structures about the orbit. The only hope lies in early removal.

TOOTH-LIKE TUMORS UNDER THE EAR.—They are manifested by a running sore, just above and behind the joint between the upper and the lower jaw, with a hard object to be felt at the bottom. Their extraction can only be undertaken by one intimately acquainted with the parts.

POLL EVIL.—This is of two kinds: 1st, a simple abscess, the result of a blow or other local injury, and which is only serious because of the strong enveloping fibrous membranes that imprison the matter beneath them; and 2d, disease of the joint between the head and the first bone of the neck, or between the first two bones.

The first if unrelieved, will usually give rise to the second, since the surface of the bones becomes the seat of disease, which gradually extends to and involves the joint. The milder form may be distinguished by the superficial position of the swelling and fluctuation, and by the comparative freedom and ease with which the head is moved, whereas in the other the head is carried stiffly and cannot be moved on the neck without extreme suffering.

Treatment.—When seen early with only a slight inflammatory swelling behind the poll and no fluctuation, purge and keep a cooling lotion (tincture of arnica 2 oz., iodide of potassium 1 dr., vinegar 1 qt., camomile infusion 1 qt.) constantly applied to the part, the patient at rest, and the head tied up to the rack. If matter has formed and fluctuation is felt, however deep, it must be opened at once. Select the part where fluctuation is most marked, and plunge a knife into the cavity. Then with a bent probe find the lowest point of the sac and cut down upon this, making a large opening from which the matter may flow as it forms. A tape should be tied in the wound and the sac syringed out daily with a stimulating wash (chloride of zinc $\frac{1}{2}$ dr., water 1 qt.) until from the disappearance of swelling and matter it becomes evident that the sac is obliterated, when the tape may be cut, pulled half way out, and left hanging from the lower wound until the upper is closed, when it may be completely withdrawn. When new sacs of matter appear these must be promptly opened and treated in the same way. A change of dressing is sometimes needed as one appears to be losing its effect (tincture of muriate of iron 1 oz., water 1 quart). In obstinate cases it is sometimes needful to lay the sacs open by an extensive incision and treat like an ordinary wound. But all these operations are only safe in the hands of those who are intimately acquainted with the structure of the part.

In case of disease of the bone it may be felt bare at the bottom of the sac by probing, and may be scraped to remove any dead or diseased part, and expose sound bone which may undergo the healing process.

If the joint is implicated the case may be deemed desperate, as it is usually only a question of time for the spinal cord to become involved.

FISTULOUS WITHERS.—This is analogous to the milder form of poll evil, differing only in its site, which is on the spines above the shoulders. It is to be treated in the same way, by free incision, the formation of a dependent orifice and injections. If the spinous processes are diseased they should be removed with bone forceps until a healthy surface is exposed.

FRACTURED PROCESSES OF THE NECK BONES.—This may arise from muscular effort, but more commonly results from jamming between two heavy bodies. If on one side only, the head is drawn to a side; and in any case the detached piece of bone may be felt among the muscles, and grating even may be produced by moving it. The only treatment is to keep the head in one position until the detached parts have become adherent, which they usually do with a visible swelling. If abscess or fistula forms the detached bone must be extracted.

TRANSVERSE FRACTURE OF THE BONES OF THE NECK.—These occur from pitching on the head, and are fatal from the sudden cessation of breathing.

FRACTURE OF THE SPINOUS PROCESSES OF BACK AND LOINS.—This is detected by the mobility, with or without grating, of the spines implicated. If comminuted, the splinters should be extracted; if simple, replace them and retain by a pitch plaster on each side, or with a saddle having a high tree and plenty of padding at the sides to support the fractured bone.

SPRAINS OF THE BACK OR LOINS.—There is inability to back, above all when mounted, or to turn quickly in a circle, tenderness at a given spot on pinching along the back, drooping when mounted, and difficulty in urination from the pain attendant on curving the back. It has

come on suddenly after slipping, falling, bearing a heavy weight, etc., and is independent of fever. It is distinguished from partial *paraplegia* by the perfect sensation in the hind parts, by the absence of any change in their temperature as compared with the rest of the body, and by the retention of perfect sensation and motion in the tail.

Treatment.—Place in a narrow stall in which the patient cannot turn his body or even his neck; apply slings to prevent any attempt at lying down; foment with warm water if there is much pain; when that has subsided, blister. It is all-important to give laxative diet, and to correct any costiveness or other impairment of the general health.

TRANSVERSE FRACTURE OF BACK OR LOINS.—This occurs suddenly from an evident cause, such as slipping, over-weighting, a wrong step, or struggling when cast for an operation. If displacement has not taken place there is an exaggerated manifestation of the same symptoms as in sprained back, but if the bones are displaced, or when the resulting inflammation and swelling have produced pressure on the spinal cord, there is *paraplegia*, coldness of the body behind the seat of fracture though that in front may be hot and perspiring; the tail is implicated in the palsy, and there is much tenderness and often a manifest depression of the seat of fracture.

Treatment.—The slighter forms are treated like sprained loins. In the more severe, the subject should be destroyed at once. If after recovery in other respects a certain lack of power remains, it must be treated like *paraplegia*.

LACERATION OF THE MUSCLES BENEATH THE LOINS.—This occurs from the hind limbs slipping unexpectedly backward or from their going back into a ditch which the animal is attempting to leap. The manifestations resemble those of broken back, as there are difficulty in rising and an imperfect control over the hind limbs, which are dragged awkwardly forward and not advanced

so far as in health. But there is no indication of paralysis and no alteration of temperature or sensibility in the hind parts, the functions of the tail are perfect, and examination through the rectum detects a soft doughy swelling, with heat and tenderness beneath the loins. *Treatment* is by slings and fomentations to the loins. If the horse is unable to get up, raise him by block and tackle and he will easily stand. Several weeks are wanted for repair of the injury, and the patient should have a run at grass before returning to work.

FRACTURE OF THE CROUP (SACRUM).—Seen in cattle and less frequently in horses, and caused by riding each other or by the fall of heavy bodies on the part. There is a manifest depression at one point of the medium line of the croup, and the tail usually hangs paralyzed. Examination with the oiled hand in the rectum at once detects the displacement, which is always downward. With one hand in the rectum pressing on the depressed bone and the other pulling the tail, the bones may be replaced and should be held so by a stiff leather sheath well padded, fixed round the root of the tail, and connected in front with a surcingle and collar. Recovery of power over the tail may be looked for.

FRACTURED RIBS.—These usually result from falls, blows and other forms of mechanical injury, and may be easily detected by a depression or soft part at the seat of fracture. If simple, they will be readily repaired under the influence of rest and girths to restrict the movements of the chest. But if comminuted, abscesses may form or necrosis ensue, demanding the removal of the dead or morbid matters. If the fractured ends have been driven in so far as to penetrate the lung, a still more serious complication is met. The air rushes from the tubes of the lacerated lung into the pleural cavity during each inspiration, and as it cannot find its way back, the whole of that half of the chest is soon filled with air and the lung compressed into a small solid mass attached to the lower end of the wind-pipe, and opposite the base of the

heart. The lesion is thus liable to prove fatal, though if arrested early by the exudation of lymph in the wound of the lung, the air may be absorbed and recovery may ensue.

WOUNDS PENETRATING THE CHEST.—Whether connected with broken ribs or only involving the muscles between the ribs, these lead to the accumulation of air in the chest and collapse of the lung, as when a broken rib has torn the lung tissue. The edges of the wound, having been driven in, act like a valve, allowing the entrance of air during the expansion of the chest, but forbidding its escape when that cavity collapses. It is far more serious than the accumulation of air in the chest from a torn lung, as decomposition and irritation are set up by the presence of germs which are filtered out in passing through the lungs. Unless the wound is small and can be closed early it is necessarily fatal.

SHOULDER LAMENESS.—The lameness which accompanies injuries to the shoulder may be so characteristic as to be recognized at a glance. The specific features are, the carrying of the head low ; the dragging of the toe on the ground in advancing the limb ; the swinging of the foot outward so as to describe the arc of a circle in bringing it forward ; and, if severe enough, the standing with joints partly bent, the heel raised and the toe resting on the ground, but without any advance of the lame foot in front of the other.

TUMORS ON THE SHOULDER.—Often preceded by chafing or galling, these consist of inflammation and suppuration beneath the large flat muscle which covers the front of the shoulder. The tissues around the matter become thickened and indurated to an extraordinary extent, so that it is often impossible to detect any fluctuation, yet it may be assumed in all cases of considerable swelling that matter really exists, and the recovery will not ensue until that has been evacuated. In slight cases only will a little nut-like induration form without matter.

Treatment.—In cases in which injury has just been sustained, suspend work or drive in a breast strap, and treat as for chafing. If a tumor forms, first subdue the more active inflammation by a dose of physic and a wet rug slung over the shoulder for several days; then open it with a knife, or preferably, draw off the liquid once or twice, at intervals of two or three days, with a cannula and trocar, and then, when the sac has been reduced to a small size, lay it freely open with the knife and treat like an ordinary wound. In very large tumors it may be necessary to push the cannula in as far as four or even six inches before the matter is reached, but the operator must persevere, directing it always to the exact centre of the swelling. The small solid tumors are to be cut out with the knife, a straight vertical incision being made through the skin, directly over the mass, which is then dissected out, and the skin brought together with stitches and treated like a simple wound.

SPRAIN OF THE CORACO-RADIAL TENDON.—
SHOULDER SPRAIN.—This is a sprain of the large tendon which passes over the point of the shoulder (the most prominent part directly in front), and in bad cases the double pulley over which it plays in front of the upper end of the arm bone is involved in inflammation and ulceration.

Symptoms.—Pendent head, dragging toe, swinging outward of the foot when being advanced, shortness of the step, and a tendency to stand with the toe only resting on the ground and the limb bent but not advanced, Swelling of the point of the shoulder is sometimes, though rarely, seen, but pressure of this point with the thumbs will detect tenderness, which is especially marked as compared with that of the other shoulder. The pressure should be made successively on the inner side of the tendon, on the outer, and on its centre.

Treatment.—First subdue the inflammation by rest, a high-heeled shoe, and a wet rug kept hanging continually over the shoulder (a blanket folded several times and tied round the neck and chest), with or without a purge and

restricted diet. When the heat and tenderness have subsided, apply a smart blister over the point of the shoulder, and repeat if lameness persists. In obstinate cases it may be needful to use the hot iron, but only on the outer side of the joint, and never on the point where the collar rests.

SPRAIN OF THE MUSCLE OUTSIDE THE SHOULDER-BLADE.—This is a sprain of the muscle which fills up the posterior cavity on the outer side of the shoulder-blade and plays over the outer side of the shoulder joint (outer tubercle of the head of the humerus). It occurs mainly in young horses when first put to plow or in others going on uneven ground and stepping unexpectedly into holes. In the endeavor to recover the equilibrium on stepping into a furrow or hole, this muscle which forms the outer support of the joint is injured, and there result heat, swelling and tenderness on the outside of the joint and a most characteristic gait. The horse may walk, or even trot, without much apparent lameness, but standing directly in front of him the affected shoulder is seen to roll outward from the body to a far greater extent than the sound one. Soon the muscle begins to waste rapidly, and in bad cases the shoulder blade may be denuded until it appears to be covered by nothing but skin.

Treatment.—In the first stages, with heat, swelling and tenderness outside the joint, rest, employ a wet rug, etc., as for sprain of the coraco-radial tendon. When this has subsided allow exercise on smooth ground (walking, working in a light cultivator), and increase the circulation over the wasted muscle by active friction with straw or a piece of wood: or by mild blisters (ammonia 1 pt, oil 2 pts.: or Spanish flies 1 part, alcohol 25 pts., steeped for 24 hours and strained): or stimulate with a galvanic battery. It may take months to refill the cavity, but in all recent cases perseverance will be rewarded. In old standing cases with fatty degeneration of the muscles, a very partial restoration only can be effected.

It must be added that wasting of the shoulder muscles is a common result of all lameness entailing disuse of the

limb, and hence many injuries of the feet and elsewhere are referred to the shoulder and designated *sweeney* (*Schwinden*) by wiseacres. In the absence of the peculiar gait above described, of the early heat, swelling and tenderness outside the joint and the rapid wasting of the muscle, the cause of the *sweeney* should be sought elsewhere than the shoulder.

DISEASE OF THE SHOULDER-JOINT (INFLAMMATION, ULCERATION, ETC.)—In the large quadrupeds, in which swelling and tenderness on handling are rarely seen, disease in the joint is to be mainly distinguished by the general symptoms of shoulder lameness and the absence of any of the signs of local disease in the tendons, already described. Movement of the joint by drawing the limb forward, and especially by drawing it backward, will usually give rise to pain, sometimes of an extreme nature.

In dogs the capsule of the joint is found to bulge on each side of the coraco-radial tendon which plays over the point of the shoulder, and tenderness may be shown when it is handled.

Treatment.—When inflammation is very severe, rest and soothing measures should be first resorted to. In the majority of cases it assumes a subacute type, and is to be treated by a high-heeled shoe, rest and counter-irritants. Repeated blistering with Spanish flies may suffice, but in obstinate cases, and wherever there is reason to suspect ulceration, the hot iron is most serviceable, applied round the outer side of the joint only.

OTHER AFFECTIONS OF THE SHOULDER.—The shoulder-blade is subject to fracture, ulceration and necrosis; the muscles beneath the bone to lacerations; the joint to dislocations (rare in large quadrupeds); and the lymphatic glands inside the joint to abscess (especially in strangles), all of which must be treated on general principles, space forbidding their further notice in the present work. Shoulder lameness may further arise from liver disease, which see.

AFFECTIONS OF THE ELBOW AND ARM.

Lameness in the region of the elbow is characterized by the inability to extend the joint fully or to bear weight upon it in this condition. In bad cases the elbow and knee joints are kept semiflexed when standing still, and when walking or trotting the dropping of the head and body is extreme, in consequence of a similar flexion. Movement of the joint will also give rise to symptoms of tenderness.

TUMORS ON THE POINT OF THE ELBOW.—These are usually caused by the heels of the shoe when the horse lies with his fore limbs bent under him (cow fashion) from undue narrowness of the stall.

Symptoms.—There is first a hot, tender swelling, and if the source of injury is kept up this may increase by small degrees to a very large size. Soon the swelling fluctuates from contained serum and it may remain thus indefinitely, the liquid being confined by the tough fibrous walls. Or the serum may be absorbed, leaving a hard nut-like tumor with no sign of fluctuation.

Treatment.—Soothe the early inflammation by fomentations or a wet rug hung over the part, and keep on a soft laxative diet. If the amount of serum thrown out is limited, it may be entirely re-absorbed by using tincture of iodine to remove the swelling. If more abundant let it be drawn off with a cannula and trocar and the sac injected with compound tincture of iodine diluted in double its bulk of water. If this is not available, lay the sac freely open at its lower part and heal like a common wound. If a hard mass is left beneath the skin it is to be cut out, as advised for those on the shoulder.

By way of *prevention* the stall must be widened, and, in the case of animals that will lie on the breast, a pad or girdle of two or three inches thick must be strapped round the pastern at night to prevent the heel striking against the elbow. The pad must be soft, covered with chamois's leather, made without a seam on its outer side, and buckled above and below so that nothing hard may touch the elbow.

WOUNDS OF THE ELBOW.—Wounds in this situation are often complicated with air under the skin puffing up the whole region, having been pumped in by the movements of the elbow. Rest is requisite, and the wound may be treated as others.

FRACTURE OF THE POINT OF THE ELBOW.—This is easily recognized, as the leg dangles, bending at the elbow and knee, and it is impossible to bear any weight on it. On taking hold of the back of the elbow the process of bone is found to be detached and loose. If excessive swelling prevents this, place the foot upon the ground, bend back the knee forcibly and let an assistant raise the opposite fore foot. If the bone is broken he will drop, if the muscles only are injured he may stand.

Treatment.—If the injury has occurred from a kick, which has seriously contused the joint surfaces, all treatment may be futile, but if not, the case will be hopeful and especially in the young. Bring the detached bone as nearly as possible into position, and retain it by a pad placed inside the elbow, and a bandage and splints continued from the foot up. The patient must be placed in slings.

DISEASE OF THE ELBOW-JOINT.—This must be diagnosed by the general symptoms of elbow lameness and by pain in moving the joint, but especially when it is fully extended.

Treatment as for diseased shoulder-joint, the applications in this case being made to the elbow. If far advanced or connected with fracture of the lower end of the arm bone or of that forming the point of the elbow, it will be usually unsatisfactory.

FRACTURE OF THE ARM BONE.—Fracture of the large bone between the point of the shoulder and the elbow may occur from blows, or even wrong steps, and is often attended by much swelling from extravasation of blood. The only resort is to place the animal in slings and keep him perfectly quiet. In rare cases re-

covery has taken place with no distortion, the broken ends, in a transverse fracture, remaining in apposition. Usually they are drawn apart by the muscles, and ride over each other so that the limb is shortened. Such a result is only desirable in breeding horses and in stock for dairy or butcher.

FRACTURE OF THE FORE-ARM.—Fractures between the elbow and knee in horses or cattle necessarily leave the animal unable to rest on the limb; if in dogs or cats one of the bones may be broken while the other remains unharmed, and weight can still be borne. There is trembling of the muscles, distortion easily felt on carrying the hand down the inner side along the line of the bone, and grating when the limb is moved.

Treatment.—If the fracture is very oblique, treatment will rarely pay in horses; but if transverse or jagged, so that the bones do not ride, the case is very hopeful. Setting the bones, with the aid of extension or counter-extension, or even ether if necessary, applying splints and bandages from the foot to the elbow, and placing in slings (if a large animal), are the essential conditions.

SPRAIN OF THE RADIAL LIGAMENT.—This is an injury of a strong, flat, fibrous band, coming from the lower third of the fore-arm and joining the back tendons just above the knee. It is characterized by a tendency to carry the pastern upright, or even to flex the knee and to stumble. The knee cannot be fully flexed without much pain, and there is a hot tender swelling immediately behind the bone, and extending from the knee about four inches upward.

Treat by rest, a laxative, a high-heeled shoe, and fomentations or cooling astringent lotions; followed when heat and tenderness subside by active blistering, should lameness continue.

SPRAIN OF THE BACK TENDONS BEHIND THE KNEE.
—THOROUGH-PIN OF THE KNEE.—This is manifested by a tense fluctuating swelling on each side of the back

tendons just above the knee and behind the bone of the fore-arm; also of a swelling behind and immediately below the knee, pressure on one of these swellings causing the filling up of the others, and *vice versa*. There may or may not be much lameness, or impossibility of flexing the knee so as to bring the fetlock pad in contact with the elbow.

Treat the inflammation as in sprained radial ligament, and the liquid distension by blister, by bandage and pads shaped like half of an egg cut longitudinally, or still better by evacuating the liquid with the nozzle of a hypodermic syringe, and then applying pressure with wet bandages.

SYNOVIAL SWELLINGS IN FRONT OF THE KNEE.—

These are of three kinds; 1st, the distension of a bursa or formation of a serous cyst under the skin, exceedingly common in heavy cattle; 2d, distension of the theca of one or more of the four tendons which pass over the front and outer side of the knee; 3d, and finally, disease inside the knee-joint and distension of the capsu'e. The first is superficial, though often possessed of very thick walls, is generally diffused over the front of the joint, and is little affected by flexion or extension. The distended thecæ extend vertically along the lines of the tendons, reaching above and below the joint, and are bound down at intervals by transverse bands; their size is little affected by bending the joint. Distensions of the joint capsule appear in the intervals between the tendons, do not extend beyond the joint except in very extreme cases, and disappear in part or entirely when the joint is bent. In this case the joint is rarely kept fully extended in standing, and cannot usually be flexed to make the fetlock touch the elbow.

Treatment.—For *Subcutaneous cysts* puncture with nozzle of hypodermic syringe, draw off the liquid, and compress strongly with wet bandages. If this cannot be done, pass a tape from above downward through the cavity of the sac, and keep in until resulting suppuration has ceased, when it may be drawn from above downward

a little at a time. Excess of inflammation may be subdued by fomentations and thick wet bandages.

The *distended theca* may be punctured with a nozzle of a hypodermic syringe and subjected to pressure, or treated with strong blisters (bichloride of mercury 2 dr., lard 1 oz.,) repeatedly applied; or simple pressure will suffice if kept up for some weeks, increasing the time daily. Setons would be dangerous.

For *distended joint* see below.

INFLAMMATION OF THE KNEE-JOINT.—This may be seen in all stages, from that in which the animal starts forward perceptibly at the knee and manifests suffering when you try to fully extend it by strong pressure on its anterior surface, to the most violent and destructive inflammation with extensive exudation of lymph and even the formation of abscess. It tends to leave the puffy swellings of its capsule referred to under the preceding heading, or distinct hard bony enlargements on the anterior surface of the joint. The animal stands squarely upon his feet with no inclination to raise the heel, and in action carries the knee-joint comparatively unbent, takes a fairly long step, and comes down with greatest force on the heels so as to wear the shoe at this point. A rider has a peculiar sensation of the chest sinking under him. The lameness increases with exercise, especially on hard surfaces.

Treatment.—Rest, without shoes; subdue inflammation by soothing applications, after which blister the part. If the animal persists in using it too freely, apply splints and bandages to fix the joint, and place in slings.

WOUNDS OF THE KNEE.

DISLOCATION OF THE KNEE-JOINT with laceration of the lateral ligaments occurs, and though if put in splints and slings the patients will sometimes recover with a stiff knee, the result is a very undesirable one.

BRUISE OF THE INNER SIDE OF THE KNEE.—**SPEEDY CUT.**—This usually results from a blow with the opposite

foot, in horses with high action, in those with narrow chests, or, above all, in horses driven in the snow-path. It is manifested by an inflammatory swelling on the prominence of bone inside the joint, resulting in a permanent scar, a serous sac, or an abscess. Its early or inflammatory stage may be treated by lotions of cold water or astringent liquids, kept constantly applied; the serous effusion by pressure or by drawing off the liquid through a fine tube, and then bandaging, and abscess by a free incision with a knife or lancet.

To *prevent*, keep the foot rather bare inside, with the shoe slightly beveled from its wearing to its bearing surface, allow no ragged nail clinches to project, and re-adjust the shoe sufficiently often (every three weeks). Or a boot may be worn extending from the fetlock to the knee, and with a rim at its upper part to warn the animal when his foot approaches this point.

WOUNDS IN FRONT OF THE KNEES.—BROKEN KNEES.—Usually sustained in falling, but it may be by striking against a manger or other hard object. They are of all degrees of severity: 1st, simple loss of hair and slight abrasion of the scarf-skin; 2d, a severe bruise of the skin without laceration; 4th, a wound laying bare the tendons and opening their sheaths; 5th, a wound laying open the joint and exposing the bones with or without laceration of the tendons; and 6th, when the joint is opened and the small bones of the knee broken.

Treatment.—1st, With simple abrasion no treatment is needed; 2d, if much bruised tie short to a high rack to prevent lying down and bandage lightly, using a mild astringent lotion (sugar of lead $\frac{1}{2}$ oz., carbolic acid 60 drops, water 2 qts.); 3d, in all cases in which the wound extends through the skin it is desirable to bend the knee to the position occupied when wounded so that the deep wounds may correspond with the superficial, and wash off with a stream of tepid water or soft clean sponge all dirt or foreign bodies, but never probe nor run any risk of opening cavities which have not been injured. Any shreds of tissue which are absolutely dead should be cut

off, but never remove any skin, however contused, as it will all be wanted. Then cutting the hair from the flaps of the wound above and below bring them together by straps of plaster or tow dipped in shellac paste, leaving sufficient intervals for the escape of matter. If the wound inflames and swells, give a purgative and dress with the lotion advised for bruised knee. In all severe cases it is desirable to sling the patient after the first few days to obviate any attempt to lie down, which would seriously protract the case; 4th, the exposure of the tendons, with escape of the glairy synovia, will entail more swelling and fever and permanent enlargement of the joint, but will demand the same course of treatment; 5th, when the tendons are crushed or torn and the joint opened, and above all when the bones are broken we have cases of increasing severity, and in few such is it desirable to subject to treatment, unless the patient is to be valuable for breeding purposes. Considerable death of tendon and even necrosis and elimination of bone may be expected, and the patient can only recover with a stiff joint. In addition to the measures already recommended, it becomes imperative to encase the limb up to the elbow in splints and bandages, as for a fracture, leaving open the part in front of the knee for dressing the wound.

SPLINTS.—These are circumscribed inflammations of the periosteum and small bones in the region of the shank, involving or not the shank-bones themselves, and resulting in small bony swellings. They occur almost invariably on the inner side of the limb, between the large and small bones of the shank, and may be usually recognized by running the fingers down the slight groove formed between the main shank-bone and its small accessory one behind. It usually connects the large bone to the small (ankylosis), but may be confined to the posterior part of the small bone, or may extend across the back of the shank-bone and appear at the same level on the inner and outer sides of the limb alike. In old horses it is not unfrequent to find the small bone united to the large along two-thirds of its length. If situated high up

and close to the knee, it is more likely to cause continued lameness than if lower down. Again, if an animal has several splints and other diseases of bone he is highly objectionable, as predisposed to bone disease.

Symptoms.—Beside the feeling of the splints on handling, as above mentioned, these symptoms may be seen. The patient may walk sound, or even trot so, on soft ground, but is exceedingly lame when trotted on a hard surface, and this lameness increases with exercise. The extreme drooping of the head is characteristic. Even before the formation of the splint tenderness may be shown on pressure, and some little heat recognized. In some cases considerable soft swelling may be felt in the early stages. In acute cases, threatening abscess, the lameness is extreme.

Treatment.—In the early stages, rest, purge, and apply cooling lotions. When heat and tenderness subside, blister. Some cases will recover promptly, others require repeated blistering and a long period of rest. If heat and great tenderness return, resort again to soothing measures. In extreme tenderness, threatening the formation of matter, the periosteum should be divided with a very narrow-bladed knife, which is passed through the skin half an inch below the swelling and carried up over it. The part must then be covered by a wet bandage.

INFLAMMATION OF THE MEMBRANE COVERING THE SHANK-BONE.—SORE SHINS.—This occurs especially in over-worked young horses. Racers are very liable, but cart-horses are not exempt. There is general tumefaction of the shank-bone or of some part of it, usually the lower, with a lameness greatly resembling that of splints. If slight and circumscribed, the exudation that takes place between the membrane and the bone is ossified, giving rise to permanent thickening, and exudation outside the membrane may follow a similar course, causing a very considerable swelling. In the more severe cases, the abundant exudation, separating the membrane from the bone, may cut off the supply of blood and entail necrosis; or the lymph may degenerate into pus which

burrows beneath the membrane, separating it from the bone and destroying the life of the latter.

Treatment.—In mild cases treat like splints. In the very severe with great tenderness and doughy swelling of the bone, make a series of incisions through the membrane covering the bone, with a very narrow-bladed knife, and by valvular wounds, passing the blade a short distance beneath the skin before cutting down on the bone. Then apply the lotion advised for broken knees.

SPRAINS OF THE BACK TENDONS.—These are the two cords which form the posterior line of the limb between the knee and the fetlock. About midway down the shank the front one is joined by a strong cord coming from the upper end of the cannon-bone and the lower row of small knee bones. This last is by far the most frequent seat of pain, so that the swelling and tenderness are observed between the upper half of the cannon-bone and the round cord which forms the posterior outline of the limb. In other cases the tendons have participated in the sprain, and they too are thickened and tender from the middle of the shank (the point of junction with the ligament) down to the fetlock. In a third class the sprain is confined to an inch or two above the fetlock. In these the swelling is to the two sides if the anterior of the two tendons is injured, and backward if the posterior is sprained. The *symptoms* are a stumbling gait, with a tendency to stub the toe into the ground, and to bend over at the knee and fetlock; an inclination to stand with the knee and fetlock slightly bent, the pastern upright or the heel a little raised; then passing the hand along the line of the tendons and in front of them in the upper half of the bone, the thumb on one side and the fingers on the other, any slight thickening is easily recognized, and if heat exists and pain on pinching, your suspicions are confirmed. In old bad cases the stay ligament and lower half of the tendons are greatly thickened throughout and the knee kept constantly bent, sometimes to the extent of causing the patient to walk on the front of the hoof. In other cases

the cords are knotted, hard and wanting in suppleness, showing calcification of their substance.

Treatment.—In the early stages of severe cases, rest, shorten the toe, apply a high-heeled shoe, and apply hot fomentations continuously, or cold astringent lotions. When heat and tenderness have subsided the high-heeled shoe may be dispensed with, the foot shod level and active blisters applied. The preparations of the iodides of mercury are among the best. In old cases of extreme contraction the tendons can be cut across by a narrow-bladed knife, with as little external wound as possible and the limb extended to its proper form and retained there by splints and bandages until new fibrous tissue fills up the interval between the divided ends. The operation is performed in the middle of the shank below the connection with the stay ligament, and is very successful in appropriate cases, restoring a helpless cripple to perfect usefulness.

SPRAIN OF THE BACK TENDONS OVER THE FETLOCK PULLEY.—WIND-GALLS.—SESAMOIDITIS.—This is the result of sprains or severe exertions, and is always associated with round elastic synovial swellings on each side of the tendons, familiarly known as *puffs* or *wind-galls*. Similar swellings arise, independent of sprains, as the result of over-exertion or dropsy of the part. The swellings may become solid by coagulation of the lymph and may be absorbed or organized, or the inflammation may attack the bone, leading to ulcerations or stony deposits. Similar stony deposits, with or without ulceration, may take place on these small bones in connection with injuries of the suspensory ligament.

Treatment.—Simple *wind-galls*, dropsical or from over-exertion, may be made to disappear by persistent pressure with a bandage and pads applied at first two hours twice a day, and two hours more twice a day thereafter, until they can be kept on all the time. It may, however, require five or six weeks, and should be stopped if it causes inflammation in the sac. Another plan is to draw off the liquid through the nozzle of a hypodermic syringe

and apply a firm wet bandage. In some quiet animals a weak solution of iodine may be injected, but this is too often injurious, or at least fruitless, from the irritability of the horse. Recent puffs will sometimes disappear under strong astringent lotions (oak-bark and alum) or under an active blister, or after firing, the contraction of the skin during healing appearing to be a principal cause of their absorption.

Where there is sprain with much heat, tenderness and tension, treat by rest, purgative, a high-heeled shoe, and fomentations or cooling astringent lotions, to be followed by blisters when the tenderness subsides.

Disease of the bones (*Sesamoiditis*) must be treated with severe blisters and even firing, with long continued rest, but if ulcers already exist on the gliding surface of the bones, a complete recovery need scarcely be looked for.

ELASTIC SWELLING IN FRONT OF THE FETLOCK.—These are of two kinds: 1st, a serous abscess or enlarged bursa under the skin; and 2nd, the distension of a large synovial bursa between the extensor tendon and the capsule of the joint. The first swells out as a uniform rounded tumor on the front of the joint. The second has at first the appearance of a double tumor from the swelling appearing at the two sides of the extensor tendon, and it is only in severe cases and advanced stages that these ever meet in the centre. They usually result from pricks or bruises, though the second form may be associated with sprain. Any existing inflammation should be subdued by soothing measures and a blister applied early to secure absorption of the liquid if possible. Should this fail the liquid may be drawn off as advised for wind-galls, and the part tightly bandaged. Or a free incision may be made in the lower part of the sac, and wet bandages applied to keep down inflammatory action, while the sac is obliterated by healing from the bottom.

DISEASE OF THE FETLOCK JOINT.—This is occasionally the seat of simple dropsical effusion, causing it

to swell out like wind-galls on the inner and outer sides, just above the sesamoid bones. The swellings are, however, placed more anteriorly than distensions of the tendinous sheath, and pressure upon them does not cause bulging nor fluctuation behind and below the fetlock, on the line of the tendons. This is not necessarily connected with lameness, though if the result of inflammation of the joint, that is more likely. Inflammation of the joint may be recognized by the habitual resting of the leg, which starts forward at the fetlock, by the appearance of wind-galls just described, and by a swelling, heat and tenderness of the entire joint. Bending the joint fully causes intense pain, as does also full extension.

Treatment does not differ from that of other inflamed joints.

BLOWS ON THE INSIDE OF THE FETLOCK.—CUTTING.—Like *cutting* on the inner side of the knee, this arises from blows received in action. Weak animals with turned-out toes and distorted feet are most liable. It is to be treated by soothing measures, and if the bones or joints become involved, treat as advised for the respective injuries.

To *prevent*, let the feet be kept a little bare on the inner side and the shoes slightly levelled off, but avoid lowering the foot or thinning the shoe on the inner side. On the contrary, a very slight thickening of the shoe on the inside is sometimes beneficial, by straightening up the fetlock and removing it from danger. If this fails wear a leather boot with a projecting rim, or a simple woollen bandage. In weak subjects benefit is often derived from bringing into a better condition of health.

BONY GROWTHS ON THE PASTERBONES.—RING-BONES.—These usually begin as inflammation of the membrane covering the bones, and at such points as give attachment to ligaments, namely: the lateral aspects of the lower or small pastern bone, and of the lower end of the upper or large bone. This is a circumscribed,

tender and somewhat elastic swelling, with more or less soft, doughy engorgement of the investing soft parts, and in course of time the exuded matter, at first soft, becomes hard and bony. The process in the early stages often appears to consist in the dragging of the periosteum and vessels from the surface and the development of bone beneath. But as the disease advances the whole surface of one or both bones may become involved, leading to a general deposition of new bony matter, extending, it may be, over the joint between the two pastern bones, or between the lower pastern and the bone of the foot, and abolishing all movement. Ringbones may also take origin in partial fractures, in concussion, in rheumatoid disease, and in faults of nutrition, in which the earthy salts are largely passed with the urine.

Symptoms.—Lameness may be almost altogether absent, or it may be extreme in such cases as are attended by active inflammation of the bone or joint, or when the joint has become fixed by bony deposit. The heel may be first brought to the ground or, in the hind foot, the fetlock may knuckle over and the toe strikes first. The lameness is worst on hard ground and usually increases with exercise. Swelling may be scarcely perceptible and confined to the inner or outer side of one pastern bone, or it may be an extreme enlargement of the whole pastern region. It may be hard throughout in old cases, or softer and slightly elastic at points where active disease is still going on. Forcible bending of the pastern causes much pain, as also pressure on the swelling and especially on the softer and more recent deposits.

Treatment.—Rest, second the indications of nature in order to secure an easy position, using a high-heeled shoe when the animal walks on the toe and a thin-heeled one when he walks on his heel. If there is very active inflammation, adopt soothing measures first, and then blister severely, or even fire. Corrosive sublimate and camphor, 20 grains of each, muriatic acid, 10 drops, and oil of turpentine, 1 oz., is often useful in such cases, but should be watched, and washed off when sufficient exudation has taken place, otherwise it may blemish. In

firing it is usually desirable to penetrate the skin in points, but never keep the hot iron long in contact, lest the radiated heat destroy the integument. It is often needful to allow a rest of several months for consolidation of the new deposit. When the joints are much affected, the only cure is by the growth of bone over them and the abolition of movement, and then there remains some stiffness, though there may be ability for slow work. Old horses recover less satisfactorily than young ones. If there is reason to suspect a rheumatic complication, or any general fault in nutrition, these must be attended to.

SPRAIN OF THE FLEXOR TENDONS BEHIND THE PASTERNS.—This is of two kinds, though both in almost the same seat. Opposite the first pastern joint the posterior tendon divides into two branches, which passing over the inner and outer sides of the other tendon are inserted on the corresponding aspects of the head of the small pastern bone. Between these branches the other tendon plays over a raised fibro-cartilaginous pulley, its gliding being favored by a synovial sac. This last tendon may be sprained as it plays over this pulley, in the median line of the back of the limb, and either of the branches of the other tendon may be sprained close to its attachment on the inner or outer side of this pulley.

Symptoms.—Standing quiet, the animal keeps the fetlock and pastern joints slightly flexed, the foot advanced six or eight inches, the heel slightly raised and the toe resting on the ground. In action he steps short and stubs the toe into the ground and generally improves as he warms up to work. The toe of the shoe wears faster than the heel, and the heel in old standing cases may be a little contracted, but it is not unnaturally warm, nor is there wincing on tapping the quarter or the sole to either side of the body of the frog, with a hammer. This serves to distinguish from disease of the small pulley-shaped bone of the foot—the misnamed *coffin-joint disease*. Pressure on the tendons in the hollow of the heel causes much pain and wincing, and the precise seat

of injury may be ascertained from the position of greatest suffering—in the median line, to the inner side or to the outer.

Treatment.—Shorten the toe, apply a high-heeled shoe, and surround the pastern with bandages soaked in cold water, or some cooling astringent lotion. A purgative will be useful if inflammation runs high. When heat and tenderness subside, any remaining lameness may usually be removed by a blister on the front and sides of the pastern.

SPRAIN OF THE HIP.—This is one of the most common injuries of the hip, and is located in the tendon of the largest muscle of the buttock as it plays over the large process on the head of the thigh-bone. Its exact site is easily found in thin horses by the prominence over the joint, and midway between the anterior and posterior angles of the hip-bone. There is the usual dragging hip lameness, a quick short step with the affected limb, the hip being moved as little as possible, suffering when the member is drawn forward and tenderness to pressure on the seat of the sprain. Swelling and heat are rare because of the depth of the lesion. In cases of any standing the muscles of the quarter waste.

Treatment.—Long continued rest, with at first fomentations, and later, active and repeated blisters, or even the hot iron applied in points. Some chronic cases do well under a combination of exercise and counter-irritants as follows: rub the affected quarter with oil of turpentine, then take out and exercise in a circle until covered with perspiration; then return to the stable, rub down and clothe with a double wet blanket over the lame quarter. Repeat daily for some time.

DISPLACEMENT OF THE ABDUCTOR FEMORIS.—Lean cattle are subject to a peculiar form of hip lameness, from displacement backward of the large muscle which plays over the prominence at the head of the thigh-bone. The high, bony process presses on the anterior border of the muscle, preventing it from resuming its natural posi-

tion. The anterior border of the muscle forms a prominent painless cord extending from behind the hip-joint to below the stifle. In moving, the toe is dragged along the ground, being extended backward, and the limb is flexed with effort, and often in a sudden and convulsive manner, and accompanied by a dull sound. The symptoms are most marked if the animal is made to step over a bar of six or eight inches high as he leaves the stable.

Treatment.—Some recover under good nourishment with or without blisters, but usually it is best to make an incision over the front of the cord, an inch or two below the head of the thigh-bone, and cut the border of the muscle across with a narrow-bladed knife. The animal may be kept quiet by the bull-dog pincers in his nose, and by drawing the opposite limb forward with a line passed through a collar.

DISEASE OF THE HIP-JOINT.—This may be connected with a partial fracture of the bones of the quarter extending into the joint, with laceration of the ligaments, with ulceration of the bones, or with simple synovitis, from over-work, rheumatism, or other cause. The symptoms strongly resemble those of sprain of the hip, but there is no pain on pressure upon the prominence on the head of the thigh-bone, but often much suffering when the limb is drawn outward and backward, so as to place the ligaments on the stretch. It is attended with wasting of the muscles of the quarter.

Treatment.—Rest, sling if at all convenient, foment the quarter with a thick rug repeatedly folded, and finally, blister actively, or, still better, fire. A long period of rest is usually necessary.

DISLOCATION OF THE HIP.—This is almost unknown in the horse excepting in connection with fracture, but is not uncommon in lean cattle and small animals as a consequence of falls and dragging of the limb to excess in any one direction. It will even happen from extreme dragging of the limb outward when caught over a bar. Displacement is usually *forward* or *backward*. In the

former case the limb is shortened, the prominence of the head of the thigh-bone carried forward and the toe turned out. In the latter the limb is elongated, the prominence of the head of the thigh-bone carried backward and the toe turned inward. Dislocations inward and outward are also described and would be marked by the deviations of the limb from its normal position, and the depression or increased prominence of the head of the thigh-bone.

Reduction.—Lay the animal on the opposite side of the body; maintain the body immovable by a strong sheet carried between the thighs, and held by several men or fixed to a firm object; attach a band round the limb above the hock and let two men drag upon this, or one man *carefully* with the aid of a block and tackle; meanwhile the operator, seizing hock and stifle, must turn the upper part of the limb in a direction opposite to the displacement. If *forward* the hock is raised and the stifle depressed; if *backward* the stifle is raised and the hock depressed; if *inward* a smooth round billet of wood is to be placed between the thighs, to act as a fulcrum, upon which the limb is depressed when sufficiently stretched; if *outward* the lower part of the limb must be drawn outward and upward, while weight is thrown on the thigh-bone; or by movements of the limb it may be changed to a dislocation forward and reduced from that position. It may be necessary to relax the muscles by a full dose of chloral-hydrate before attempting to reduce. When reduced the head of the bone slips in with a jerk and an audible sound, and the limb assumes its natural position. The animal may then be let up, and should be kept quiet and alone for several days. These cases do far better than could be expected from the anatomical arrangements of the part.

DISLOCATION OF THE KNEE CAP.—Not uncommon in certain breeds of horses, this usually occurs when standing at rest in the stable or rather after rising. The limb is drawn forcibly outward and backward, the foot resting on the toe, and the animal is helpless to move it.

The bone may be felt displaced at the outer side, at what should be the most prominent anterior point of the stifle. In young horses it may be attended with ulceration of the pulley over which it plays, but, in the adult, this is very exceptional.

Reduction may sometimes be effected by starting the animal with a whip, the limb being brought forward under the violent effort and the bone meanwhile slipping into place. More commonly it is requisite to draw the foot forward, either by simply lifting it, or by the aid of a rope having a noose round the fetlock, and passing through a collar on the neck. While the limb is being advanced, a hand should be placed on the bone outside the stifle to press it into position. When reduced keep on a level (not slippery) floor; apply a shoe with a toe piece projecting an inch in front of the hoof, and curved up; and finally put a smart blister on the joint.

Second Form.—A modification of the above is seen in horses and cattle, in which the knee-cap is drawn too high during extreme extension of the stifle, and then pulled outward by the abductor muscles; its inner lateral ligament slips into the notch above the pulley, over which the bone should play, and the animal remains helpless with the limb drawn back as in ordinary dislocation. There is a depression in front of the upper part of the stifle, surmounted by a swelling which is soft, not hard, as it would be were the current explanation of *cramp of the muscles* correct. The reduction is by the same method advised for ordinary dislocation, and the after treatment identical.

DISEASE IN THE STIFLE JOINT.—If *between the knee-cap and its pulley* the patient usually drags the toe on the ground, steps short and brings the foot forward with a swinging outward motion. The leg is kept half bent when standing, the knee-cap is left to move loosely on the pulley, causing pain, and an elastic fluctuating swelling is felt beneath it in the intervals between the three descending ligaments. In disease of the *inner or outer division of the true joint* the animal stands with it in the

same position, but in walking it may either be jerked up suddenly, or in the worst cases, this joint and the hock are carried in a stiff extended position and the principal movement is in the hip. An elastic swelling may usually be felt beneath the knee-cap but it is less prominent than in disease of the pulley, and the bone is less mobile and does not cause pain when moved.

Treatment.—All cases require a high-heeled shoe excepting such as are attended with dislocation of the knee-cap, in which case a thin-heeled shoe with a projection forward at the toe is indicated. Rest is essential, and in case of very acute inflammation, fomentations should precede repeated blistering or firing. A long rest is imperative. In ulceration of the bones and dislocation of the knee-cap in young animals, the fault is mainly in nutrition, and a rich diet, tonics, pure air and sunshine are demanded.

FRACTURE OF THE LEG BETWEEN THE THIGH AND HOCK.—The *principal bone of this region (tibia)* lying superficially on the inner side of the leg is very liable to fracture from kicks. The *symptoms* are patent enough when the fracture is complete, the bone hanging useless, and the broken ends being easily felt beneath the skin. But in very many cases the bone is only split part of the way through and the patient may show little lameness, may even do a fair day's work or perform a long journey with his broken bone. But with the occurrence of the exudation and softening around the seat of injury, the bone gives way under a slight strain, and thus the fracture appears to have occurred from getting up in the stall, though several hard days' work may have been done since the injury was received.

Treatment.—In all cases of blows on the inner side of the leg in which a line of tenderness extends from the point of the bone which has been struck, place the animal in slings and wait for repair. A compound or comminuted fracture of this bone need hardly be treated in large quadrupeds. A simple transverse fracture may recover in slings, with a firm bandage and splints from

the foot up to above the stifle. I have had a fair recovery even with a very oblique fracture, but this should only be attempted in valuable breeding animals.

The *smaller bone of the leg (fibula)* may be fractured by falling in shafts or across a pole or beam. The resulting lameness is most puzzling as the broken ends of the bone are held together by fibrous tissue, and though they move hinge-like no grating is produced. Then the bone is so deeply covered by muscle that it cannot be felt. A blow on the outer side of the hind leg, just below the stifle, inducing persistent lameness, with tenderness on pressure along the line of the bone on the outer side of the limb, and without any other apparent injury, implies fracture of this bone.

Treatment.—A month's absolute rest and one or more blisters over the seat of injury.

SPRAIN OR LACERATION OF THE MUSCLE WHICH BENDS THE HOCK.—This is often sprained at its lower part, and especially in its inner branch which passes over the front and inner side of the lower part of the hock joint, giving rise to a swelling exactly in the seat of bone spavin. It is distinguished by its tense, elastic nature and by its position on this tendon rather than above or below it.

Treatment.—A smart blister, or this failing, evacuate with a fine nozzle of a hypodermic syringe and then apply a wet bandage or blister. This form is rarely hurtful.

When more severely sprained the swelling, heat and tenderness may be felt in front of the hock or on the anterior and outer side of the stifle according to the seat of injury. The limb is usually carried very straight, there being little or no bending of either hock or stifle. It is to be *treated* in the ordinary way by soothing measures followed by blisters or firing.

Lacerations of the muscle, or more frequently *rupture of the tendon* occurs, causing the hock to be carried straight and the shank dangling nearly in a line with the leg. In some instances from violent contraction of the extensor

muscles, the foot may be jerked out backward when the patient is started. In injury to the muscle there is at first a depression at the part with swelling above and below, but soon the hollow fills up and may become prominent, soft and doughy. In rupture of the tendon the depressed interval, or later, a soft doughy swelling on the line of the cord in front of the hock, is sufficiently characteristic.

Treatment.—Rest, and astringent lotions to the part (acetate of lead 3 drs., water 1 qt.) These cases almost always do well.

SPRAIN OF THE HAMSTRING.—This is productive of lameness with manifest pain in extending the hock and a jerk in lifting the limb, and is easily recognized by the firm swelling of the cord above the point of the hock. It is to be treated by a high-heeled shoe, with fomentations and subsequently blisters to the part.

RUPTURE OF THE HAMSTRING.—This is much more serious, the hock and fetlock bending so as to render the limb useless whenever weight is placed upon it. The separation of the divided ends can easily be felt through the skin.

Treatment.—If in large quadrupeds place in slings. In all apply an immovable bandage, and splints extending from the foot to some way above the hock, so as to keep that joint fully extended.

CAPPED HOCK.—This is of two kinds : 1st, a serious distension of a bursa which exists between the skin and the point of the hock ; and 2d, sprain of the tendon inserted on the point of the hock (gastrocnemius) or of the one which plays over it (perforatus).

1. The distension of the subcutaneous bursa usually results from kicks or blows, and is to be feared as indicating vice, but rarely causes lameness. The soft fluctuating swelling is directly backward from the point of the hock, and may be of almost any size. Slight and recent cases may be treated by a purge and soothing lotions to

be followed as soon as heat and tenderness subside by a smart blister (iodide of mercury 2 drs., lard 1 oz.) Should the sac remain, evacuate with the nozzle of a hypodermic syringe and apply a wet elastic bandage; or open by a small orifice below and heal like an ordinary wound. To *prevent* its repetition is a much more difficult matter as it usually implies the cure of a vice. Stretching prickly bushes or chains behind him, tying chains or logs to the limb above the hock, or applying hobbles are all more likely to ensure permanent injury to a nervous animal than to cure him of his vice. A kicking strap will often succeed in harness.

2. In case of sprain of the tendons, the swelling takes place at the two sides, and above rather than at the point of the hock. It is more or less tense, but elastic, and even fluctuates on pressure. It is often attended with severe lameness, which may become permanent, in connection with ulceration of the bone. It is to be treated like an ordinary sprain by high-heeled shoe, and fomentations or cold astringent lotions, followed by blister. If swelling remains it may be punctured and compressed as in the first form of *capped hock*, but a seton should not be used.

SPRAIN OF THE FLEXOR TENDON (PERFORANS) BEHIND THE HOCK.—THOROUGH-PIN.—This tendon plays over the back of the hock, to the inner side of the bony process which forms its point, and has a large synovial sheath extending above and below the joint. When sprained at this point there is lameness, a tendency to knuckle over at the fetlock, and a round, tense, elastic, fluctuating swelling on each side in front of the point of the hock, and in the hollow between the hamstring and the bone. Pressure on the one side causes bulging on the other, and pressure on both causes fluctuation on the line of the tendon below and behind the hock.

Treatment.—A high-heeled shoe, rest, fomentations, or cooling lotions and a purgative. When heat and tenderness subside, blister repeatedly, or even fire when there is reason to suspect disease of the bone. When all lameness

ness has passed off, leaving only a puffy swelling, or when that has appeared without lameness as the *result of work* or as a *dropsical effusion*, apply a spring bandage with two smooth round pads pressing on the inner and outer swellings.

FRACTURE OF THE INNER MALLEOLUS.—This consists in fracture of the bony prominence on the inner side of the hock at its highest point. It usually results from a blow with the opposite foot in fighting flies. There is more or less swelling of the part, with an unnatural mobility of the process, and, in some cases, distinct grating. It is not unfrequent to have a wound in the skin, and a flow of glairy synovia from the opened joint. In other cases, independently of fracture, there is inflammation and enlargement of the bony eminence.

Treatment.—Rest is imperative, as the fracture often implicates the joint. If synovia escapes, use a sugar of lead lotion (1 oz. to 1 pt. water and 60 drops carbolic acid), or even apply a blister around the joint, leaving the space of an inch around the wound untouched. In other cases rely on soothing applications, followed by blisters when heat is diminished. Such cases usually do well, even an open joint being harmless from the wound being at its upper part. Even pieces of bone may be taken out with portions of the joint surface, and yet a satisfactory recovery ensue.

FRACTURE OF THE POINT OF THE HOCK.—This may merely implicate the extreme summit of the bone in young horses, or it may occur lower down in the middle of the bony process. There is much lameness and difficulty in bringing the foot to the ground, the limb being often kept raised and semi-flexed, and the detached portion may be felt in front of the point of the hock, or a line of tenderness may be detected across the middle of that bone, detachment and grating being obviated by the strong fibrous investment.

Treatment.—If a portion has been detached from the summit, place in slings, extend the joint and replace it,

retaining it in position by firm pads of tow placed in the hollow in front of the bone, and a strong starch or plaster bandage extending from the hoof to beyond the hock. When there is no detachment, soothe the parts till heat and tenderness subside and then blister, allowing a long period of rest.

FRACTURES OF THE OTHER HOCK BONES.—If these implicate the upper or true hock joint, they are usually beyond remedy, but if the lower flat bones only, they present symptoms like those of bone spavin, and may recover by union of the small bones.

BONE SPAVIN.—This consists in disease (inflammation, ulceration, bony deposit), of the small flat bones in the lower and inner part of the hock joint, often implicating those of the outer side as well. It may be manifested by local swelling, heat and tenderness, or these may be altogether absent as in cases of ulceration in the centre of the joint between the flat bones—(*Occult Spavin*). The swelling, when it does exist, is on the antero-internal aspect of the lower part of the articulation, to be seen by standing about two feet from the fore limb and looking across the front of the joint. It is hard, and to be distinguished from the tense, elastic swelling caused by sprain of the inner branch of the flexor tendon, and from the soft distended vein (so-called *blood spavin*) which passes across this part of the joint. The bony swelling may be more to the front or more backward on the inner side of the hock, or it may even show mainly on the outer side. It frequently implicates the head of the shank-bone, and in bad cases may extend up to the true hock-joint and even abolish its movement. Lameness, which is usually present in recent cases, and is the only symptom in *occult spavin*, is shown by moving stiffly on the toe, when the horse is turned from side to side of the stall. The same stiff walking on the toe is seen for the first few steps in starting, after which it disappears, but there remains a stiffness and lack of bending in the hock and stifle joints, which a little practice will enable one to recognize.

There is sometimes, however, a jerking up of the limb as in *string-halt*. If turned quickly in a narrow circle, the animal drops on the limb, carries it stiffly, or even rests on the toe only. If the lameness is only moderate it will usually disappear when the patient becomes warmed up at work, hence the propriety of placing him in a quiet stable for twenty minutes before examination.

Treatment.—Rest; a high-heeled shoe; fomentations and laxatives are appropriate to the early inflammatory stages. Later, counter-irritants are demanded. Blisters of any kind will usually succeed. The hot iron is perhaps even more efficient. Deep firing in points is especially beneficial. Some cases will resist all these modes of treatment, but recover after section of the flexor tendon which passes over the swelling. Other methods are pursued with variable success. All may do well in young horses with no constitutional infirmity, and all will fail in some old subjects.

INFLAMMATION OF THE TRUE HOCK JOINT.—BOG SPAVIN.—Inflammation of the upper or principal joint of the hock, where nearly all the movement takes place, occurs from overwork, sprains, rheumatism, punctures, wounds, fractures, etc. There is a puffy, fluctuating swelling, with heat and tenderness on the antero-internal side of the upper part of the joint, where in the natural state there is hollow or depression. There is also a similar swelling behind in the seat of *thorough-pin*, but distinguishable in that it can be pressed forward by compression, the anterior swelling meanwhile filling up, but there results no swelling below and behind the hock as in *thorough-pin*. The lameness resembles that of *bone spavin*, but there is perhaps more tendency to a jerking up of the limb. The disease may go on to ulceration of the joint, to bony deposit, and even to ankylosis, with abolition of all movement.

Treatment.—Rest, and use a high-heeled shoe. In case of very violent inflammation, use soothing measures (for mentation), and when extreme heat and tenderness have subsided use blisters, as for bone spavin, or still better

the hot iron applied lightly at nearly a white heat. Open joint is to be treated here as elsewhere, an active blister being often of great advantage in arresting movement, closing the wound and abating inflammation.

Bog spavin is most obstinate in old animals and in rheumatic constitutions, with cracking of the joints in starting a walk.

DROPSY OF THE HOCK JOINT.—BOG SPAVIN.—An excessive secretion of joint-oil, from over-exertion, or a dropsical effusion into the cavity of the joint produces a swelling, having all the characters described above, but without heat, tenderness or lameness. It may sometimes be benefited by a blister, or even by a bandage wet with some strong astringent lotion, but as it is only a blemish and does not interfere with the animal's usefulness, it is best, as a rule, to let it alone.

BLOOD SPAVIN.—This is a dilatation of the vein which runs over the seats of *bog* and *bone spavins*, and being harmless should not be interfered with.

CURB.—This is a swelling, at first soft and doughy, but later hard and resistant, in the median line of the limb and just behind the lowest part of the hock joint. It is best seen by standing to one side of the limb and looking directly across it. The injury is usually a sprain of the tendon (*perforatus*) which plays over the front of the hock, though in some bad cases the ligament of the hock beneath this is injured as well. There is heat and tenderness with more or less lameness and a tendency to knuckle forward at the fetlock. *Curby hocks* are congenital in some horses and cannot be looked on as disease, but rather distortion.

Treatment.—Keep quiet, put on a high-heeled shoe, and apply hot fomentations or cooling lotions until inflammation moderates, when an active blister may be applied. In some severe cases this may require to be repeated, or resort must be had to the hot iron, but this is altogether exceptional.

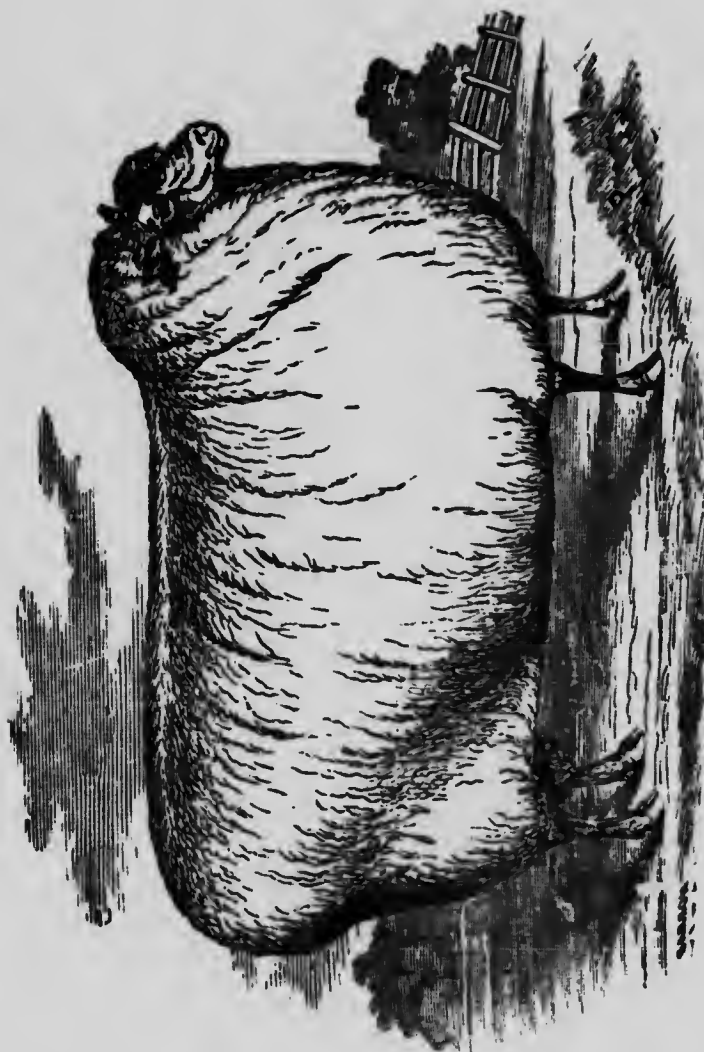
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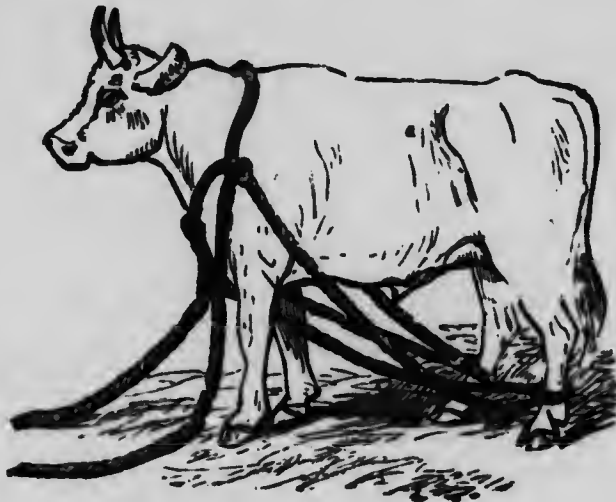
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COTSWOLD SHEEP.

STRING-HALT.—This is the name given to a habit of suddenly jerking up the hind limb when raised from the ground. It may be shown only in turning from side to side in the stall, and in starting, or it may appear in walking or trotting as well. Again, the jerk may be comparatively slight, or so extreme that the fetlock may even strike the belly. Its causes are unknown, though manifestly it is a reflex nervous act, and may perhaps be determined by a variety of local injuries. If any such can be found they should be corrected, but as a rule treatment is eminently unsatisfactory. The affection is usually aggravated with time and the animal is sooner fatigued and worn out than other horses.

OTHER CAUSES OF LAMENESS.—See Lymphangitis, Embolism, Farcy, Dropsy, Grease, Horse-pox, Mammitis, Rheumatism, Cramps, Palsy, Liver Disease, etc.





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(ANSI and ISO TEST CHART No. 2)



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CHAPTER XIX.

DISEASES OF THE FOOT.

General causes. Maxims for shoeing. Disease of the bony pulley and flexor tendon of the foot. Pedal Sesamoiditis. Podotrochilitis. Navicular disease. Coffin-joint lameness. Side bones. Fracture of the bones of the foot. Inflammation of the foot. Laminitis. Founder. Chronic Laminitis. Convex soles. Pumice foot. Cracks in the hoof-wall. Sand-crack. Quarter-crack. False quarter. Horny tumor of the Laminae. Corns. Bruises of the sole. Pricks and binding with nails. Incised wound of the sole. Distortions of the coffin-bone. Contraction. Treads on the coronet. Fistula of the coronet. Quittor. Powdery degeneration of the deep parts of the wall. Steady toe. Inflammation of the secreting membrane of the frog with discharge. Thrush. Canker. Simple foot-rot in cattle and sheep. Contagious foot-rot. Foot-rot from Tuberculosis.

Nearly all of these pedal diseases are directly or indirectly the result of faults in shoeing, and the absence of care for the feet. Here, accordingly, it would be appropriate to describe the structure and functions of the foot, and lay down the rational principles of shoeing. But our space forbids more than the merest mention of points which are absolutely indispensable to the understanding of what is to follow.

The internal frame-work, or skeleton of the horse's foot, consists of three bones :—the lower end of the coronet (small pastern) bone, which corresponds to the upper margin of the hoof; the coffin (pedal) bone, which is imbedded inside the hoof, and has a similar imperfectly conical outline; and a long, narrow, pulley-like bone (small sesamoid, or navicular) extended across the back part of the coffin-bone, its upper aspect forming a prolongation backward of the joint surface, while its lower face is covered by fibro-cartilage, and constitutes a pulley, over which plays the flexor tendon of the foot. These are subject to like injuries with similar parts else

where. Thus the bones are liable to fracture, to absorption from pressure, to ulceration, to bony out-growths, to induration, to softening, to death and exfoliation, in connection with pricks with nails or other sharp bodies. The joint is subject to inflammation, in connection with wounds, rheumatism, overwork, etc. The flexor tendon is exposed to sprains, and, together with its synovial sheath and sesamoid bone, to inflammation, ulceration, and the formation of new structures, which impair or destroy the functions of the part.

The posterior third of the hoof has for its frame-work an elastic cushion, which makes continuation of the bones backward, without maintaining their rigidity. This cushion comprises two lateral fibro-cartilages that extend backward from the heels of the coffin-bone, and the upper elastic borders of which may be felt under the skin, just above the hoof, in the region of the quarter; also in the median line and continuous laterally with the cartilages, a thick pad of white and elastic fibres, corresponding in position to the horny-frog, and known as the *elastic frog*. These are subject to inflammation, suppuration, ulceration, ossification, fractures, necrosis, etc. In its healthy condition this cushion obviates the shocks, jars, concussions, bruises (corns), fractures and lameness which would necessarily result were this region occupied by unyielding bone. It further allows of expansion of the heel under continuous use and application of moisture, and its contraction under prolonged disuse and drying.

Covering this bony and elastic frame-work is a dense fibrous net-work, with interspaces and canals for the passage of blood-vessels and nerves, firmly bound to the bony and elastic structures by its deeper surface and to the hoof by its superficial. On the outer surface of this fibrous net-work is the membrane secreting the horn. The part which forms the hoof-wall is prolonged as a band around the upper margin of the wall, and from the heels forward above the cleft at each side of the frog. It is shaggy throughout with soft conical processes (villi), from $\frac{1}{4}$ to 2 lines in length, which extend into the horny

tubes and secrete them. The membrane forming the sole is covered by similar villi which pass into the horny tubes of the sole, and that covering the *elastic frog* has corresponding but smaller villi. Between the fibrous net-work and the inner surface of the hoof wall and bars, the mode of union is by a series of 500 to 600 leaves (*laminæ*) projecting on an average $1\frac{1}{2}$ or 2 lines, and each having on its lateral aspects from 30 to 60 microscopic secondary *laminæ*. These are interleaved with the same number of primary and secondary horny *laminæ*, forming an extent of connecting surface that would beget incredulity if named. These inner fibrous and vascular *laminæ* secrete the horny *laminæ* that are interleaved with them, besides giving off an amount of moisture, which, being absorbed by the cells of the adjacent horny wall, serves to keep that soft, yielding, and tough. So intimate is the union between each of these secreting surfaces and the horn covering it, that the fibrous network will often be torn from the bone, rather than the horn from the sensitive parts. This is above all true of the *laminæ*. This close connection further renders active inflammation in these structures acutely painful, for there being no loose tissue to yield to the exudation, it compresses these dense structures and violently tears them apart. Thus extensive effusions of serum or pus endanger separation and shedding of the hoof. A less acute inflammation of any of these secreting surfaces leads to the production of unhealthy horny growths. Thus disease of the secreting membrane at the coronet will determine a bulging, ragged, brittle line of horn from above downward on the hoof-wall, or, what is worse, a crack or fissure extending to the quick. Disease of the *laminæ* will determine the formation of a great mass of soft, spongy yielding horn between the horny *laminæ* and the hoof-wall, causing a falling in of the wall anteriorly, and a descent of the margin of the coffin-bone so that it will press upon and even perforate the sole (*pumice foot*). In other cases there is merely a circumscribed horny growth pressing inward on the quick at a particular part (*keraphyllocele*). If the secreting surface of the sole is involved similar

horny tumors may be formed, as in *corns*. Disease of the secreting membrane of the frog may determine an unhealthy secretion from the cleft (*thrush*), or an excessive growth and loss of cohesion of the horny fibres (*canker*).

In addition to these disorders originating in the deeper structure, we have a further list that take their origin in unnatural states of the horn. And for these the current modes of shoeing are mainly chargeable.

At all points the hoof undergoes a steady condensation from its inner to its outer layers. In a transverse section of the hoof-wall the deeper tubes are open, spacious, and surrounded by soft, yielding elastic horn, while those near the surface are exceedingly minute and surrounded by a far greater amount of dense, hard, and exceedingly resistant horny matter. The outer surface is especially close in its texture, and as the tubes run through the whole length of the wall to its lower or wearing surface, where they are closed by attrition, comparatively little exhalation of moisture can take place from this part of the horn in its healthy state. But it is far different when the dense surface layer has been removed by the rasp, and the open ends of the tubes exposed all over the surface of the wall. Then evaporation and drying go on rapidly, the hoof becomes hard and brittle and follows its constant tendency, when dry, to turn in at the heels and coronet, causing absorption of the parts beneath and laying the foundation of disease.

The sole and frog naturally increase in density from the quick outward, but the horn breaks up into plates before becoming detached, the plates being separated from each other and from the tough elastic horn above by layers of powdery horn, which serve along with the plates to protect from bruises and check evaporation. In their healthy state, therefore, sole and frog are as well protected against evaporation, drying and shrinking as is the wall. But the case is altered when, with buttress or drawing-knife, these native protectors are removed and the tough elastic horn is laid bare. Then each horny tube exhales its moisture, the horn dries and shrinks, drawing inward the lower borders of the hoof-wall and

pressing upward, often painfully, on the quick. Nor can the sole any longer bear contact with hard bodies, but bruises and injuries are the constant result.

The injury in both cases may be lessened somewhat by the use of suitable *hoof ointments*, but the process may be likened to that of supplying a man with a wooden limb after you have ruthlessly cut off his own sound one. The substitute may permit of the limb being useful, but the difference, in utility, safety, and durability, is almost infinite.

Among other injuries by shoeing may be mentioned unequal strain thrown on different parts of the hoof for want of a uniform bearing on the shoe; bruises of the sole from the shoe being improperly fitted, or left on too long until it has grown out over the shoe, or been drawn forward by the excessive growth at the toe until the heel settles on the sole between the wall and the bars; misdirection of the bones and joints by leaving one side of the hoof much higher than the other, or by leaving the toe or heel unnaturally long or short; pricks and binding by nails, etc., etc. Long-continued compulsory idleness in a stall, exposure to prolonged moisture, with intervals of drying, and continued contact with decomposing liquids, and to the irritating ammoniacal fumes of dung and urine, are further destructive conditions for the horn.

Maxims for Shoeing.—The proper care, preparation and preservation of the foot is of far more consequence than the form of the shoe. The hoof must be preserved from knife and rasp, excepting the line around its margin and lower surface on which the shoe is to rest. This may be pared or rasped, as a rule, until the elastic horn of the sole is reached, and forms, with the lower border of the wall, a continuous smooth bearing surface of a breadth equal to perhaps one and a half times, or twice the thickness of the latter. But this is only in a perfect foot. One that has a ragged furrow between the sole and the wall cannot be treated in this way. Both sides, inner and outer, must be left perfectly uniform in height. The height of heel and toe must be determined by the natural form of the foot, excess and deficiency being alike avoided.

As a rule, paring has to be done mainly or alone at the toe, but in some cases the heels grow excessively as well. While avoiding paring out of the heels and bars as the prolific cause of *corns*, we must equally avoid the retention of hard flakes of horn in this situation, where, imprisoned by the hoof-wall, the bar and the shoe, they act as foreign bodies and bruise the heel, as would a stone or a mass of hardened clay. That part of the sole which is uncovered by the shoe may have the surface-flakes removed with a blunt instrument, but should never be touched with a knife. The frog need never be touched, though there is no harm in removing ragged hanging shreds and patches. The sharp edges of the hoof-wall should be slightly rounded with a file to prevent splitting. The shoe should be of a weight proportionate to that of the horse and to the work expected of him, and of a breadth of web adapted to the protection demanded by the nature of the sole. Its upper or applied surface may be perfectly level, unless when an unhealthy convex sole demands that it shall be leveled off toward its internal border. Its outer border should exactly correspond to the margin of the hoof-wall, without projecting beyond it, or requiring that the wall be cut down to its dimensions. When applied the upper surface should fit accurately at all points to the hoof. Bad as it is for horn to be seared, it is better to apply the shoe, momentarily, at a dull red heat, that any imperfection in fitting may be detected and remedied, than to hurry on a shoe which bears unequally on different points. If the sole joins the wall without a break, the two forming one continuous bearing surface, and if both are of their natural thickness, the shoes are better to be coarsely fullered and the nails driven low, the fullering becoming finer and the nails being driven lower as we proceed from before backward, especially on the inner side. When the nails have been drawn up and riveted any roughness of the rivets may be removed with a file, but this should not touch the hoof if it is possible to avoid it. In turning down the clinches better make a slight depression beneath each with the point of the drawing-knife than an extended

transverse furrow with the rasp, as is usually done. Remove the shoes before the hoofs have overgrown them so as to allow them to settle on the sole, and above all before the growth of the toe has drawn the shoe forward and let the heel press upon that part of the sole.

DISEASE OF THE BONY PULLEY AND FLEXOR TENDON OF THE FOOT.—PEDAL SESAMOIDITIS.—PODO-TROCHILITIS. NAVICULAR DISEASE.—This affection, misnamed *Coffin-joint Disease*, implicates the lower surface of the small sesamoid bone of the foot, its synovial sac and ligaments, and the flexor tendon which plays over it.

Causes.—It is especially the disease of fast horses, and may be largely charged to friction between the tendon and its bony pulley, to overwork and concussion. But it may also depend on injuries to the foot from bad shoeing ; undue paring ; setting in of the shoe on the sole ; imprisoned flakes of horn acting as foreign bodies ; bruises from stones or hardened clay ; rasping, hardening and contraction of the foot ; drying and shrinking of the foot from standing too long idle in the stall ; injury to the quick from uneven bearing of the shoe in connection with misfitting shoes or breaking of the hoof-wall ; injuries from nails driven into the quick or picked up on the road ; a rheumatic constitution ; impaired nutrition with increased elimination of phosphates from the system ; or an extension of disease from the digestive organs as in an over-feed of grain, or a drink of cold water when hot and fatigued, etc.

Symptoms.—*Pointing* the affected foot eight or ten inches in advance of the other, with the heel slightly raised when standing quietly in the stable. This symptom may last for months before lameness is shown. Stepping short and on the toe with a great tendency to stumble when first moved from the stable, which lameness may entirely disappear after going a mile or two. It is worse when cooled off after a long drive, but it may appear intermittently while at work, as occasional stumbling or dropping on the sound foot for some time at first.

The toe of the shoe is more worn than other parts owing to the peculiar gait. The foot feels hot, especially in its posterior part, and in acute cases the soft part may bulge over the coronet and the pastern arteries throb with unusual force. The foot, too, soon diminishes in size, especially in the quarters and heels, where the heat, drying and disuse are greatest. Testing the margin of the hoof with pincers will not elicit tenderness, unless there is accompanying disease of the lateral parts of the foot (corns, bruises, pricks, absorption or distortion of the heels of the pedal bone, side bones, etc.,) but tapping the sole with a hammer on each side of the body of the frog, or striking the wall in the region of the quarter, will cause the patient to flinch. Pressure with the thumb over the middle of the flexor tendon, on its inner side or on its outer, as deeply as can be reached in the hollow of the heel, the foot being bent back, causes suffering. There is more or less wasting of the muscles of the limb from disuse, but this is especially marked on the breast, above the elbow and outside the shoulder-blade. Hence the disease is usually referred to the shoulder as *sweeney*. It is most readily confounded with sprain of the flexor tendon behind the head of the small pastern bone, but is easily distinguished by the heat and contraction of the heels and the tenderness of the centre of the sole and the quarters to strokes of the hammer. To distinguish it from other diseases of the feet I must refer to these individually.

Treatment.—Usually unsatisfactory except in certain recent cases. First soothe inflammatory action, give a laxative (aloes), remove the shoes, shorten the toe, and keep standing from morning to night in a puddle of wet clay without stones or gravel, in which the animal will sink to the top of the hoof. At night place in a comfortable dry stall with a poultice on the diseased foot. Unless the inflammation is severe, apply a mild blister to the front and sides of the pastern. If not applied at first this should be resorted to as soon as inflammation moderates, and is to be repeated when the effects of the first pass off. Cases that resist this treatment will fre

quently recover under the action of a seton passed through the frog, and a run for a month or two in a damp pasture free from stones. The recovery may be a restoration to perfect soundness, when the surface of the bone has not been diseased, or it may be a removal of lameness in connection with a union of the bone and tendon when the surface of the former has been the seat of disease. In the last named case, the recovery is likely to be the more permanent, while many cases of apparent recovery, in the early stages, are followed by relapse. The frog seton is introduced at the hollow of the heel and brought out at the body of the frog, but as there is much danger of wounding the tendon or bursa in incompetent hands, it can only be safely undertaken by the veterinary anatomist.

All other methods failing, resort is often had to cutting the nerves passing to the foot, so as to remove all sensibility. This should never be done unless the feet can be carefully picked out and sponged every time the animal returns from work, and kept covered with thick wet swabs all the time he stands in the stable. Neglect is sure to be followed by rapidly advancing disease in the bone, extension of inflammation to the structures around, abundant exudation, and destruction of bones and joints. Even with the best of care this will occur in the advanced stages of the disease, unless indeed the bone and tendon grow together. For description of *neurotomy* see larger work.

SIDE BONES.—These consist in extensive ossification, from the heels of the coffin-bone into the lateral cartilages. Their great cause is improper shoeing; cutting away of the bars or sole, so that the wall turns inward and bruises the sole; pressure of the shoe on the sole whether from misfitting or from being left too long on; uneven bearing of the shoe, throwing too much strain on one part; pricking or pinching with nails driven too near the quick; the pressure of the dry hard horn after undue paring or rasping, and the continuous irritation which attends the partial separation of sole and wall.

They are especially common in heavy horses with upright pasterns and the toe shortened relatively to the heels or shod with high heel calkins, so as to increase concussion in action.

Symptoms.—Lameness with a short stilty step, and a tendency to stumble from the attempt to avoid shock on the heels. The pasterns are upright and the heels often deep and strong. Pressure on the prominence above the hoof at the quarter detects tenderness and a hard unyielding structure instead of the usual yielding elastic gristle. Bruises of the heel (corns) with bloody discoloration of the horn is almost a constant result of extensive side-bones, the sensitive sole being pinched between the bone and hoof.

Treatment.—Subdue any existing inflammation by rest, blisters, or even firing at the coronets, and apply a bar shoe, the bar resting on the bulbs of the frog, and keep the hoof-wall, at the heels, rasped lower than the rest of the bearing surface, so that daylight can be seen between this part and the shoe. The same shoeing must be kept up when the horse is put to work, or he will soon fall lame again from bruising of the heels. Excision of the ossified calage and neurotomy have been resorted to with success, but are inapplicable to most cases.

FRACTURE OF THE BONES OF THE FOOT.—The small sesamoid may be broken after it has been weakened by superficial and internal absorption. The pedal bone may give way from concussion when previously softened by disease, or in cases of blows on the surface, laceration and detachment of horn, or wounds with nails or other sharp bodies implicating the bone. The sudden and extreme lameness following an evident injury or a long-standing disease may rouse suspicions of this, and if grating be heard the case is certain. *Treatment* is rarely successful, excepting in circumscribed fractures from wounds, in which case the detached bone must be removed.

INFLAMMATION OF THE FOOT. — LAMINITIS. — FOUNDER.—This consists in inflammation of the sensitive

parts of the foot, but predominating in the anterior portion of the laminae, where the greatest strain comes in standing.

Causes.—The disease may arise from direct injury, as in over-exertion on hard roads, blows, bruises, or freezing of the feet, pricks or binding with nails, continued injury from a badly applied shoe, or the constant strain upon the feet during a long sea voyage. It may also occur from a sudden chill, from drinking cold water when heated and fatigued, from over-loading of the stomach with grain, from muco-enteritis, the result of an over-dose of purgative medicine, or from diseases of the lungs (pneumonia, bronchitis). Small and deformed feet and large flat ones often suffer. Horses with heavy fat carcasses are also predisposed.

Symptoms.—When not caused by direct injury to the foot, it is usually ushered in by fever and general stiffness and soreness of the surface, with or without shivering, but independent of any tenderness of the foot. If not relieved these are soon followed by tenderness of the foot, usually predominating at the anterior part, but sometimes settling in the heel and causing *pedal sesamoiditis*. When acute inflammation is developed in the laminae of the fore feet the horse is in a high fever, with full hard pulse, excited breathing, distended nostrils, extension of the fore feet forward, so that they rest only on the heels, and bringing of the hind feet far forward beneath the belly, to bear as much of the weight as possible. If moved, the horse groans, sways himself back on his hind parts, drags the fore feet on their heels, or balancing himself on the hind, lifts both fore feet at once and brings them down again on their heels. The affected feet are warm, even hot, and the animal refuses to have them lifted because of the pain consequent on standing on one. If they are struck with a hammer the animal winces and groans. The arteries on the pasterns throb violently. The hairs of the mane and tail may often be pulled from their follicles, showing the general implication of the skin. If one fore foot only is affected it is kept raised and advanced. If the hind feet, they are advanced

beneath the belly, and the fore feet carried as far backward as possible to bear the greater part of the weight.

Treatment.—In the initial stage, with general stiffness but no special tenderness of the foot over other parts, vascular and nervous tension may be relieved and the disease suddenly cut short by full doses of sedatives (lobelia, tobacco, aconite), with warm clothing to encourage perspiration. Even at a more advanced stage, when the feet are becoming congested and tender, the same may be resorted to, the feet being enveloped in warm poultices, and the animal encouraged to lie down by supplying a clean comfortable bed of straw. Or in place of poulticing the feet, we may seek to improve the circulation by walking without shoes on a soft, newly plowed field, the heels having been slightly lowered, if very high, to allow pressure on the sole, or the patient may even be walked on a hard surface after a long bar shoe, with broad web and a slight rising at heel and toe (rocker fashion), has been applied. But walking can never be resorted to when the extreme tenderness and fever show that active inflammation has set in. In this case a mild laxative (aloes) must be given (unless already purging) and followed up by aconite or other sedatives, the feet must be enveloped in large poultices and the animal encouraged to lie down. Should he refuse to lie down, the hoof-wall should be rasped down to let the sole come in contact with the ground. In severe cases the coronet may be scarified with a sharp lancet and the foot placed in a bucket of warm water, or fomented with the same to favor bleeding. In the course of two days, if the suffering, fever and local tenderness are increasing rather than abating, the sole may be thinned and opened at the toe, so as to evacuate any serous exudation and limit the separation of the horn from the quick, the poultices being kept on after as before. In the course of ten days or a fortnight the inflammation should have subsided far enough to warrant the application of a blister to the pastern and an ointment to the hoof, while the patient is turned out on a soft, wet pasture, or kept standing a part of his time on wet clay.

CHRONIC LAMINITIS. — CONVEX SOLES. — PUMICE FEET.—If the inflammation persists in a slight form, an excessive growth of soft, spongy horn takes place in front of the laminæ at the toe, separating the coffin-bone from the hoof-wall and allowing its anterior border to press upon the sole, or even to perforate it. The hoof-wall becomes covered with rings usually running together at the toe, where it bulges out below and falls in above. Complete restoration cannot be expected in the worst cases of this kind, but much may be done for the majority. Put on a thick, broad webbed, bar shoe, beveled toward the inner side on its upper surface and thinner at the heel than the toe, dress the sole and wall daily with hot tar, apply gentle blisters around the coronet, and keep in a very soft, damp pasture. The new growth of horn may grow down almost perfect in appearance, but it retains an undesirable brittleness.

CRACKS IN THE HOOF-WALL. — SAND-CRACK. — QUARTER-CRACK.—The predisposition to this is usually to be found in rasping and drying of the hoof-wall, in uneven bearing of the shoe, in alternate soaking of the hoof in water and drying, and in treads or other temporary wounds or injuries to the coronet. The crack extends from the coronet downward, for a variable distance, in the direction of the horny fibres. If attended by lameness, the laminæ are usually being pinched between the edges of the crack, the irritation is perhaps further increased by the presence of sand and dirt, and fungous growths may appear in the sore.

Treatment.—A carefully applied bar shoe having an even bearing all round the foot; a nail driven through the edges of the crack and riveted so as to hold them together; a transverse groove, $\frac{3}{4}$ to 1 inch in length, cut to the quick just above the upper end of the crack, and active stimulation or slight blistering of the coronet above this point will usually succeed in obtaining an unbroken growth from above, and when the crack has grown off at the lower border the hoof is perfect. But the inflammation will sometimes demand poulticing;

the nail may have to be replaced by a metallic plate fixed to the hoof on each side of the crack by screws not exceeding a line in length ; a gaping crack may require filling with gutta-percha or other hard substance to keep the edges immovable ; or, finally, it may be requisite in bad cases to cut out a V-shaped piece of horn, the apex corresponding to the middle of the crack and the two limbs to the coronet on the two sides of the crack.

FALSE QUARTER.—This is similar to a sand-crack in appearance, but caused by such destruction of the secreting structure at the top of the hoof that it is impossible to obtain a growth of horn to fill up the interval. Palliation by careful shoeing is all that can be accomplished.

HORN TUMOR OF THE LAMINÆ.—This is a result of sand-crack, the irritation leading to an increased secretion of horn on the inner surface of the hoof-wall, which, in its turn, may press on the quick and cause lameness. With or without any remains of sand-crack there is tenderness on pinching that part of the hoof, and when the shoe is removed and the hoof pared, there is observed a semi-circular encroachment on the sole by a white spongy horn extending in from the hoof-wall. Wet swabs on the foot and rest may subdue any inflammation, but should lameness persist, the only resort is to cut out a triangular portion of the wall, including the tumor, poultice the part, then cover with tar, and wait for the horn to grow down in a healthy condition.

CORNS.—These are at first simple bruises of that part of the sole included between the bars and the wall at the heel, but later there is often an increased production of horn, and the formation of a horny tumor, which presses injuriously on the quick. In other cases the bruise causes active inflammation and the formation of matter, which, if denied escape below, will burrow toward the coronet or less frequently around the toe, and give rise to disease in the deeper fibrous network, the cartil-

age or the bone. In these last conditions it usually results in fistula (quittor). In other cases the corn is *pared out* as is supposed, but the heels, having lost the mechanical support of the sole, curl forward and inward, repeat the bruise continually, keep up the inflammation and suppuration and what is equivalent to an open sore in the heel. The irritation often produces absorption of the margin of the bone at the heels with bony deposits above or below, and ossification of the lateral cartilage, a condition which almost necessarily perpetuates the bruises or corns (see *side bones*). Corns may exist in either heel, but are usually in the inner or weaker one, and prevail above all in flat feet with low weak heels.

Symptoms.—Lameness with a tendency to *point*, with the heel slightly raised when at rest, and a short, stilty, stumbling step when moved. Pinching the affected heel with pincers or tapping it with a hammer causes wincing. If the shoe is removed and the heel pared out, the horn may be seen to be blood-stained, but unless this is seen on removing the flakes, no one should allow curiosity to lead to a deeper search. If suppuration has taken place the tenderness is extreme, often causing the animal to keep the foot raised and scarcely daring to touch the ground with the toe, a tender swelling usually appears at the coronet above the affected heel, and pinching or hammering of the heel is unendurable. A horny tumor may be recognized by symptoms similar to those shown in *keraphyllocele*.

Treatment.—If a recent bruise and uncomplicated, apply either a bar shoe or a common one, but rasp down the bearing surface of the affected heel, to avoid pressure as advised for side bones, and place the feet in water or keep the wall moist with wet swabs, and the sole with oil meal or clay packing. When tenderness has subsided, smear the hoof with ointment and work carefully. Remove the shoe early enough to prevent pressure on that heel, and in preparing the foot retain the strength of the heel by preserving the elastic horn of the sole between wall and bar. Never allow this to be pared and

weakened unless it be to evacuate matter or sand, or for the removal of a horny tumor.

If suppuration has taken place, pare down the heel until the matter escapes, remove all horn detached from the quick, and pare the horn around this to a thin edge, poultice until the surface is smooth, dry and not at all tender, then apply a bar shoe, a leather sole, and a stuffing of tow and tar or crude turpentine (pine pitch). No pressure should be allowed on this heel until the sole has grown up to its natural level, as a support. Horny tumors may be removed by paring out and treating as above advised, until the sole attains its natural growth. If old-standing corns are connected with death of a portion of the heel, of the foot bone, or ulceration of the lateral cartilage, these must be scraped or cut off before improvement is to be expected. If connected with *side bones*, they are liable to be kept up by frequent pinching of the quick between the bone and horn, and demand careful shoeing to avoid pressure on the heel. Some cases may be benefited by cutting out the side bone.

BRUISES OF THE SOLE.—Whether resulting from badly applied shoes, stones, accumulated gravel or dried mud, these are to be recognized, like corns, by pinching the hoof or tapping it with a hammer, and are to be treated on precisely the same principles, relieving the pressure when necessary, soothing the parts, opening when matter has formed, followed up by poulticing and bar shoe, with leather sole and tar stuffing.

GRAVELING is closely allied to the above, dirt having worked up through the unnatural groove between the wall and sole, and set up suppuration. Except in the careful removal of the foreign elements, treatment does not differ from that of suppurating bruise or corn.

PRICKS AND BINDING WITH NAILS.—These usually occur in thin, weak feet or such as have been reduced by over-cutting and rasping till there is little to hold the nails; in the case of nail stubs being left in the hoof from a former shoeing, so as to turn the new nails in a

wrong direction, and when the blacksmith is too stupid to recognize the difference between the stroke of driving a nail into the soft spongy horn and the hard firm outer horn of the wall. Simple binding with the nails may cause intermittent or persistent lameness, and there is flinching on striking the heads of the nails or the walls with a hammer, or in compressing the margin of the hoof with pincers. If matter forms there are all the local tenderness and inability to use the foot spoken of in suppurating *corn*. In simple pricks an examination of the nail clinches usually reveals one higher than the rest, and if this is a posterior one it is all the more suspicious. A nail may be driven too near the quick, and yet not cause lameness for a week or two, until some slight shifting in the position of the shoe causes it to press painfully.

Treatment.—In slight cases the withdrawal of the nail may be all that is necessary. In more severe it may be requisite to punch the nail holes nearer to the toe, to drive the nails low, to apply cold water or other soothing agent to the foot and to rest for a day or two. If matter has formed the course of the offending nail must be followed with the drawing-knife, the pus evacuated and the parts treated afterward as in suppurating *corn*. If the bone has been reached and a dead scale exists on the surface this must be cut down upon and removed.

INCISED AND PUNCTURED WOUNDS OF THE SOLE.—That part of the foot which is uncovered by the shoe is liable to penetrating wounds from nails, glass and other sharp bodies on the ground, as well as nails, pitchforks, broken planks, etc., against which they may kick. Such wounds are dangerous according to their depth and position. If from a clean nail, and no deeper than just to penetrate the quick, they are usually of little consequence, and a little tar or gutta-percha may be used to fill the wound, if any, until it is seen whether inflammation will ensue. If deeper, a vertical wound will be most serious in the middle third of the sole, because of the implication of the flexor tendon and small sesamoid bone, and the risk of *pedal sesamoiditis*, or even an *open*

coffin-joint resulting. If in the anterior third, the danger lies mainly in injury to the lower surface of the coffin-bone, with death and removal of a thin scale which must be thrown off before the wound can close. If in the posterior third the elastic frog alone is wounded and will heal very readily.

Treatment will vary accordingly. The simple removal of the foreign body may suffice. Cold applications may be needed, matter may require an opening to escape, or the bone may have to be scraped to expose a living surface. But in wounds of the tendon or joint the foot must be wrapped in cloths, the heels raised if standing, and a constant stream of cold water kept up on the part, by having a caoutchouc tube attached to the limb and foot and acting like a syphon to bring the water from a bucket at a higher level. This may require to be kept up day and night for several days. The subsequent treatment is like that for *pedal sesamoiditis*.

DISTORTIONS OF THE COFFIN-BONE.—Under this head may be named a great variety of deformities, the result of disease. Thus in long continued inflammation of the laminae the fibrous net-work in front of the coffin-bone is partly ossified, giving this part a convex aspect from above downward. Continued irritation of the sole will equally develop a bony enlargement which is associated with a circumscribed convexity and tenderness of the sole. The pressure of a horny tumor, whether on the laminae, the quarter or elsewhere, corresponding to and pressing on the bone, will cause absorption and depression of the bone to an equal extent. The pressure on the anterior border of the coffin-bone, when separated from the hoof-wall and resting upon the sole, leads to extensive absorption and rounding of this part with a bony deposit above, on its front. Persistent irritation along the lateral borders of the foot from binding with nails, or the separation of the wall and sole, with or without the presence of gritty matters in the groove, causes absorption and rounding of the sharp lateral margins of the coffin-bone. But the heels of the coffin-

bone are the parts which above all suffer in this way. Bruises from setting in of the shoe, from gritty matter or hard clay, especially if a furrow has been formed between wall and sole, from curving forward and inward of the heels when the supporting sole has been pared out *in search of corns or to prevent their formation*; pressure from curving in of the wall which has been allowed to grow too long without support from the sole, or has been rasped till it dries or withers; uneven bearing of the shoe; all undue paring of heels and quarters contribute to produce absorption and rounding of the naturally sharp border of the coffin-bone at its heels, bony deposits above and below, induration, softening, ulceration or death of more or less of the bony tissue, and permanent unsoundness.

The existence of such distortions must be ascertained from the unnatural appearance of the hoof; the signs of a horny tumor; a rugged unhealthy hoof-wall; a flat or convex appearance of the sole in whole or in part; a deep furrow between sole and wall; wasting and diminution of the foot as a whole, but especially of the heels and quarters; and it may be side bone or fistula. There is more or less tenderness of the feet and stilty careful gait, or there may be extreme lameness. It will be observed that these distortions are usually connected with some other disease of the feet, and the symptoms will vary according to the nature of the accompanying lesion.

Such changes of bony structure are permanent as a rule, so that our attention must be given, first to the removal of any unnatural condition which has caused and is perpetuating them, and then to secure such a system of shoeing as will allow of the utilization of the animal in spite of the acquired deformities. The hoof must be encouraged, by ointments, stimulants to the coronets, and perhaps a cool moist pasture, to grow as nearly as possible to the natural condition. Then the shoe must be applied so as to secure the greatest extent of bearing surface, without injury to the deformed and weak points. In many cases a bar shoe is wanted to avail of the frog for bearing weight; a leather sole may

be necessary in others ; a broad web to the shoe, on one or on both sides, may be essential for protection ; in other cases the upper surface must be bevelled ; in still other the nail-holes must be stamped only around the toes ; clips, small nails, artificial repairs of breaches in the hoof-wall may be resorted to, but it is beyond the scope of this work to do more than hint at what can only be accomplished by a combination of anatomical knowledge, mechanical skill and manual dexterity.

CONTRACTION.—This is a great bugbear of horsemen, since it exists in nearly all the affections of the foot. It is usually a result and symptom of disease, attending as we have seen on many different maladies, in which the hoof shrinks from the heat, dryness and disuse. It may also occur from simple idleness in a stall ; from overgrowth of the hoof-wall, which curls in for want of support from the sole and moisture from the laminae ; from hardening and shrinking of the heels as the result of rasping, or of alternate soakings and drying ; from undue paring of the heels, bars and frog, thus removing the natural supports ; and from the effects of the shoe and nails in preventing the normal expansion in growth, and in removing the frog and sole from use and pressure. Thus produced it is not a direct cause of lameness, and feet can be shown in which the two heels overlap each other without such a result. Yet such contraction implies wasting or absorption of the internal sensitive structures, diminution of the basis of support, with a corresponding weakness and tendency to disease under slighter determining causes than in the healthy state. The simplest treatment is to remove the shoes round the edges of the hoof-wall to prevent splitting, and keep standing sixteen hours a day, for two or three weeks, in a puddle of wet clay, then use hoof ointments freely, and apply a shoe with equal bearing throughout and without any bevel on its upper surface.

TREADS ON THE CORONET.—These are especially common in winter, when the shoes are sharpened for

frost. They are dangerous because of the frequent implication of the horn secreting structures, so as to cause *false quarter*, and from the tendency of matter to burrow beneath the horn and in the supporting fibrous net-work to form a *fistula*. They should be thoroughly cleansed from all sand and mud, the inflammation subdued by soothing applications (wet bandages or weak astringent lotions) and care taken to prevent the further introduction of dirt. To this end a simple covering of tar will sometimes suffice, but in other cases a carefully applied bandage is essential. Muddy roads should be avoided until healing is complete.

FISTULA OF THE CORONET.—QUITTOR.—*Causes.*—Treads and other wounds of the coronet; suppurating corns, bruises, pricks and wounds of the sole; suppuration from the working in of sand or gravel between the sole and wall; irritation from sand-cracks and false quarters, and disease of the coffin-bone or its cartilage.

Symptoms.—Following on some one of the above disorders there is a tender swelling at the coronet, which bursts, discharging a more or less whitish serous fluid, and shows no tendency to dry up or close. If probed, it is found to lead into one or more small canals in the fibrous net-work which covers the bone and elastic structures of the foot, and it may be to diseased or dead portions of bone or gristle.

Treatment.—If the inflammation is very violent the foot should be enveloped in a large poultice and a laxative administered. When moderated, inject a slightly caustic solution in the direction of each canal and as far as possible. (Bichloride of mercury 5 grains, spirits of wine 1 oz., muriatic acid 20 drops.) Less depends on the composition of the mixture than on the application. Inject it three times the first day, twice the second, and once a day thereafter. When the discharge has ceased and the wound is almost superficial, stop the injection and apply a simple dressing of wet tow. In aggravated cases, with disease of the lateral cartilage or bone, these

may require to be cut out or scraped, but our limits will not permit a further notice of this.

POWDERY DEGENERATION OF THE DEEP PARTS OF THE WALL.—SEEDY TOE.—The result of uneven bearing of the shoe, the formation of furrows between the sole and wall, direct violence, as blows, or the too tight hammering of clips, etc., this is manifested by an irregularity of dryness of the affected part of the wall, and the formation of a cavity, filled with horn powder between the laminæ and the wall of the hoof. Clear out the cavity until the tough healthy horn is reached, then fill with warm tar and shoe carefully to give a uniform bearing. A clip may be useful as a support to the undermined horn, but it is destructive to hammer it tight. The dressing must be repeated at each shoeing until the cavity is filled up.

INFLAMMATION OF THE SECRETING MEMBRANE OF THE FROG WITH DISCHARGE.—THRUSH.—*Causes.*—Exposure to wet and filth; standing on dung, or in a dirty, wet yard; stuffing the feet with cow-dung; bruises of the frog; undue paring; wounds of the frog; accumulation of dried mud or gravel in the cleft; extension of disease from the skin of the heel, etc.

Symptoms.—Fœtid discharge from the cleft, soreness of the skin behind this, lameness or not according to severity.

Treatment.—Wash out the diseased part, pare away all ragged, detached horn, and apply some astringents (dry calomel pressed in on a pledget of tow; tar with a few drops of sulphuric acid on the surface; carbolic acid; or finely powdered sulphate of copper or zinc).

CANKER.—This is a most inveterate inflammation of the frog, and it may be the sole, representing in the horn-secreting structures that aggravated affection of the skin of the heel in which red fungous growths appear. It may be preceded by *thrush*, and is due to the same general causes, though it is also attributed to a parasitic

fungus. It is especially common in coarse lymphatic subjects.

Symptoms.—A rapid growth, from the frog or sole or both, of a soft, unhealthy, spongy horn, the tubes of which are unnaturally large, open and wanting in cohesion, so that they often stand apart from each other, and have the appearance rather of a fleshy material than of horn. If cut down it may grow up to the same level in twenty-four hours, and the enlarged villi are reached and bleed long before this would have happened in healthy horn. As in thrush, there is a most offensive discharge, and the disease is very obstinate to treat.

Treatment.—Cut down the fungous horn till blood comes, and the adjacent horn to the same level. Then cover with tow soaked in tincture of muriate of iron, and apply firm pressure by slips of wood placed side by side, with one end of each resting above the web of the shoe at the toe, and the other on a slip extending across the bulbs of the frog, and resting above the heels of the shoe. This must be removed and the dressing renewed at least once in twenty-four hours. Should the course of improvement seem lagging, change the dressing for carbolic acid, chromic acid, the mineral acids, sulphate of copper or iron, chloride of zinc, quicklime, chloride of antimony or other caustic, resort being had to a new one in every instance as the former seems to lose its effect. The removal of the entire sole is essential to recovery in some cases.

SIMPLE FOOT-ROT IN CATTLE AND SHEEP.—This is a simple inflammation of the horn-secreting structures and adjacent skin, the result of direct irritation. Wearing of the sole to the quick from long journeys on hard roads; curling in of over-grown walls on the sole on soft boggy pastures; wounds with sharp bodies like nails, glass, etc.; the accumulation and drying of clay or mud between the claws; softening of the horn and irritation from standing on hot, reeking manure; irritation of the skin around the coronets by iced water, etc.

Symptoms will vary according to the form, but in all

there is lameness, often severe, the sheep getting down on its knees to feed, and an examination of the foot shows the nature of the injury. In the case of wounds with nails, glass, etc., the heat of the hoof will show the injured one, and a slight paring will detect the wound if not the offending body.

Treatment.—In case of a simple superficial rawness between the claws, clean the part and touch with a feather dipped in a mixture of one part of sulphuric acid and three or four parts of water; or the surface may be smeared with tar and a bandage tied between the claws and around the pastern. In case of the formation of matter beneath the horn, the foreign body, if any, should be removed, the detached horn pared away until we reach that which is still connected with the quick, the surrounding horn should be pared down to a thin edge and the sore covered with tar, with a few drops of sulphuric acid on the surface, the whole being closely bound up in a bandage. In exceptional cases the severity of the inflammation may demand a poultice, over the surface of which a weak solution of sugar of lead may be poured. One tar dressing is often enough, but the foot should always be examined a few days after, and any hindrance to the healing process removed. Bad cases with fungous growths must be treated like similar cases in the horse.

Sheep kept in low, soft pastures should have the hoof sharpened by a knife or toe nippers at short intervals, to prevent injury to the sole.

CONTAGIOUS FOOT-ROT presents symptoms resembling those of *simple foot-rot*, but usually begins at the coronet, unless in the case of pre-existing sores, and tends to produce fungous growths of the skin around the margin of the hoof, and a degeneration of horn in some respects comparable to *canker*. It is mainly to be recognized by its spread in a flock as a sequence of contact with diseased animals, and without any sufficient cause in their management or in the dampness of the locality.

Treatment does not differ materially from that of *simple foot-rot*, except that a pre-emptive must be given to

antiseptics in the selection of caustic dressings. Hydrochloric acid reduced with thrice its bulk of water; chloride of zinc 1 dr., water 1 pint; carbolic acid; butter of antimony, may be cited as examples. Much more important, however, is it to separate the sound from the diseased, and from contaminated pastures and buildings, and to thoroughly cleanse and disinfect the latter before they are again used for the shelter of the flocks (see *Disinfection*).

FOOT-ROT FROM TUBERCULOSIS.—This is common in cattle and sheep, the disease commencing in the digital bones, which are enlarged with interstitial and surrounding deposit, leading to open sores, open joint and complete destruction of the member (see *Tuberculosis*).



CHAPTER XX.

DISEASED GROWTHS.

The limits of the present work forbid any systematic description of the various degenerations of tissue (fatty, mineral, amyloid, pigmentary, etc.,) and of the tumors or diseased growths which appear in different parts of the system. The last will only be noticed so far as to point out the principal distinctive characters of the malignant tumors or cancers, and the simple.

Simple Tumors are composed of elements like those previously existing at the same or some other part of the body; they do not tend to draw surrounding structures into their substance, but grow between these and push them aside; usually they are surrounded by distinct sacs which separate them completely from surrounding tissues except where the blood-vessels enter; they do not tend to produce swellings in the nearest lymphatic glands, by reason of propagation of elements absorbed from the diseased mass, nor an unhealthy constitutional state—dyscrasia—tending to the formation of such diseased masses in internal organs; and their elements tend to be resolved mainly into fat or gelatine by boiling; which shows there is little albumen in their structure.

Cancers, on the other hand, usually contain elements unlike any previously existing in the system. The presence of large cells, each containing smaller ones (nuclei) in its interior, and these still smaller nuclei (nucleoli), was at one time thought characteristic of cancer, and though this cannot now be maintained, yet the abundance of such cells, or of any cells, implying the growth of the tumor is always highly suspicious. These tumors have no clearly defined limit, nor limiting sac, but grow in the natural structures, drawing them into their substance and transforming them into a cancerous mass. Hence, a cancer near the surface will often lead to a depression at first by the drawing in of the skin, and in the

mammary glands the drawing in of the teat is a most characteristic early symptom. They are hereditary, tending to appear in the offspring at the same age as in the parent. They lead to early and painful swelling of the adjacent lymphatic glands, of the internal lymphatic glands and of the spleen, and produce or aggravate the unhealthy constitutional state on which the deposition of cancer depends. If removed, there is a great liability to the formation of cancer in the same situation or some other, and especially if we fail to remove the whole organ in which the disease primarily appeared. They are more vascular, and grow faster without apparent cause (mechanical injury, exposure,) than simple tumors. Finally, they contain an excess of albumen, and the larger the proportion of albumen, of cells and granules, the more rapid is the growth and the more redoubtable the result.

The *Hard Cancers (Scirrhus)* are firm and crisp under the knife, and from the cut surface exudes a whitish fluid—cancer juice—containing the characteristic cells and granules. *Soft or Brain-like Cancer* is very soft and friable, bleeds freely when wounded, contains a great excess of cells and granules, and from its rapid growth pushes existing tissues aside so as to feel more circumscribed. It is the cancer of the young and of particular organs, such as the eye, grows rapidly, opens early, exposing a raw, unhealthy, bleeding surface, and has a short and fatal course. It is often complicated by an extensive production of black pigment (melanotic cancer). In *Epithelial Cancer* the morbid product consists mainly in epithelial cells, and it grows downward into the substance of the tissues as well as outward from the skin. It is slow to implicate adjacent lymphatic glands, or to produce a constitutional dyscrasia with internal deposits, and hence its removal is much more frequently successful. *Colloid Cancer* is characterized by the formation of a mucous or gelatinous liquid containing a kernel of granules and rounded simple or nucleated cells, enclosed in spherical cavities, surrounded by a delicate membranous stroma, made up of the former tissues of

the part. *Osteoid Cancer* of ivory-like hardness, with a vascular surface and interspaces, has not been observed in the lower animals.

Treatment of Tumors.—Recent simple tumors, still largely cellular, may sometimes be removed by stimulating embrocations, as iodine ointment or tincture, camphorated spirit, soap liniment, etc. Others may be greatly reduced or even entirely removed by the occasional injection into their substance, through a very fine needle-like tube, of discutients (weak solutions of iodine). In cystic tumors the evacuation of the liquid through a fine cannula or needle-like tube, and the injection of a weak solution of iodine (one part of the compound tincture and three parts water) will often succeed. But most frequently, and especially in old-standing tumors, resort must be had to the knife or to caustics. Excision with the knife is the quickest and usually the preferable mode, but in some dangerous situations caustic may be preferred. Its employment is founded on the fact that it tends to eat away the diseased mass sooner than the healthy; but this partial immunity of the sound tissues will not warrant the use of such agents as caustic potassa or soda, which quickly permeate all cell structures alike and destroy them. Nitrate of silver, chloride of zinc, sulphate of copper, ter-chloride of antimony, or the mineral acids, are usually preferable. Protection against cold, ill-health arising from other sources, mechanical injuries and exposures to cold or wet are important elements in treatment.

For cancers, an early and extensive removal with the knife may be said to hold out the only hope. The whole organ in which the cancer grows should be cut out, as a rule, to insure the removal of all diseased elements, and any interference is to be deprecated when the adjacent lymphatic glands are already enlarged.

Attempts have been made to dissolve and remove cancers and other tumors with pepsin, and with considerable success, the agent virtually digesting the diseased products with little pain, while the healthy tissues remain unaffected.

ACTION, DOSES, ETC., OF MEDICINES.

To some readers a few words of explanation may be necessary in order to the proper understanding of the drugs and their doses.

I. EXPLANATION OF TERMS.

Alteratives change in some unexplained way the conditions and functions of organs.

Anæsthetics deprive of sensation and suffering.

Anodynes allay or diminish pain.

Antacids are antidotes to acids.

Anthelmintics kill or expel worms.

Antiperiodics obviate the return of a paroxysm in periodic diseases.

Antiseptics prevent, arrest or retard putrefaction.

Antispasmodics prevent or allay cramps.

Aperients gently open the bowels.

Aromatics, strong-smelling stimulants which dispel wind and allay pain.

Astringents cause contraction of vital structures.

Carminatives, warming stimulants (Aromatics).

Cathartics freely open the bowels.

Cholagogues increase the secretion of bile.

Demulcents sheathe and protect irritated surfaces.

Diaphoretics cause perspiration.

Discutients dispel enlargements.

Disinfectants destroy infecting matter.

Diuretics increase the secretion of urine.

Ecboics cause contraction of the womb.

Emetics induce vomiting.

Expectorants increase the secretion from the air tubes.

Febrifuges counteract fever—lower temperature.

Narcotics allay pain and produce sleep.

Parturients (Ecboics).

Refrigerants diminish heat.

Sedatives depress nervous power or lower circulation

Soporifics induce sleep.

Stimulants temporarily excite the nervous or circulatory system.

Sudorifics (Diaphoretics).

Sialogogues increase the secretion of saliva.

Stomachics improve digestion.

Tonics gradually and permanently improve digestion and nutrition.

Vermifuges kill and expel worms.

2. GRADUATION OF DOSES.

The dose given may be held applicable to full-grown animals of medium size, therefore some allowance must be made in any case in which the patient exceeds or comes short of the average of his kind. A similar modification must be made as regards young animals, not only on account of their smaller size, but also of their greater susceptibility. The following table may serve as a guide:

HORSE, ETC.	OX.	SHEEP.	SWINE.	DOGS.	
3 years.	2 years.	1½ years.	15 m'ths	½ year.	1 part.
1¼-3 "	1-2 "	9-18 m'ths	8-15 "	3-6 m'ths	½ -
9-18 m'ths	6-12 m'ths	5-9 "	6-8 "	1¼-3 "	¼ -
5-9 "	3-6 "	3-5 "	3-6 "	20-45 days.	⅓ -
1-5 "	1-3 "	1-3 "	1-3 "	10-20 "	1-16 -

Allowance must also be made for a nervous temperament, which usually renders an animal more impressible; for habit or continued use, which tends to decrease the susceptibility for individual drugs; for idiosyncrasy, which can only be discovered by observing the action of the agent on the particular subject, and for the influence of disease, when that is likely to affect the action. Thus in most diseases of the brain and spinal cord, and in some impactions of the stomach, double the usual quantities of purgative medicine will be necessary, while in influenza

and other low fevers half the usual dose may prove fatal. In acute congestion of the brain, stimulating narcotics (opium, belladonna, hyoscyamus,) would aggravate the symptoms, etc.

3. FREQUENCY OF ADMINISTRATION.

Anodynes, Antispasmodics, Narcotics, Sedatives and Stimulants may generally be repeated once in four or six hours in order to maintain their effect. Alteratives, Diaphoretics, Febrifuges, Refrigerants and Tonics may be administered twice daily. Purgatives should only be given when necessary, and should never be repeated until from the lapse of time we are assured that the first dose is to remain inoperative. Thus, unless in urgent need, a horse should not take a second dose of physic under thirty-six hours after the exhibition of the first, and in all cases, until the medicine has worked off, he should be kept at rest and allowed only warm bran mashes and water with the chill taken off. In ruminants a second dose may be ventured on in twelve or sixteen hours, and in carnivora and omnivora in from seven to ten hours. Emetics should be given in full doses and repeated in five or ten minutes if they fail to take effect, their action being further solicited by copious draughts of tepid water, and tickling of the back of the mouth with a feather.

4. THE BEST WAY TO ADMINISTER MEDICINE.

Drugs may often be given as powder or solution in the food or water; they may be made into a soft solid with syrup and linseed meal, rolled into a short cylinder and covered with soft paper; they may be converted into an effusion with warm or cold water, or into a decoction by boiling; or they may be powdered and suspended in thick gruel or mucilage. They may be given in a liquid form, from a horn or bottle; or, as a short cylinder or pill, may be lodged over the middle of the root of the tongue; or, as a sticky mass, they may be smeared on the back teeth; or they may be given as an

Injection into the rectum ; or finally, in the case of certain powerful and non-irritating agents, they may be injected under the skin.

No agent should be given until sufficiently diluted to prevent irritation, if retained a few minutes in the mouth, and irritants that will not mix with water (oil of turpentine, croton oil, etc.,) should be given in a bland oil, or milk or in eggs, after having been thoroughly mixed.



DRUGS AND DOSES.

When not otherwise stated, the doses for the horse may be given to ox, ass and mule, and those of the sheep to the goat and swine.

EQUIVALENT.

A tablespoonful is equal to half an ounce by measure; a dessertspoonful is equal to two fluid drachms; a teaspoonful is equal to one fluid drachm; a wineglassful is equal to one and a half fluid ounces.

The surest way, however, to get the true quantity is to have the article measured by properly graduated weights and measures. It will not, however, be necessary to weigh each powder separately: thus, half a pound of ginger can be easily divided into ten or twelve equal parts with a knife, without the trouble of weighing each powder separately.

ACETIC ACID, antidote to acids, cooling astringents: Horse 1 dr; ox 3 drs; ass 1 dr; sheep 1 scr; dog 2-3 drops.

TINCTURE OF ACONITE, sedative, diaphoretic: Horse 20-30 drops; ox 30-40 drops; ass 15-20 drops; sheep 3-5 drops; dog 1-3 drops.

ALCOHOL, stimulant, diuretic, narcotic: Horse 1-3 oz; ox 3-6 oz; ass 1 oz; sheep $\frac{1}{2}$ oz; dog 2 dra. *Locally* cooling astringent.

BRANDY, WHISKEY and GIN, stimulant, diuretic, narcotic: Horse 3-6 oz; ox 6-12 oz; ass 2-5 oz; sheep 10 oz; dog $\frac{1}{2}$ oz. *Locally* cooling astringent.

STRONG ALA, stimulant, diuretic, narcotic: Horse 1-2 pints; ox 2-4 pts; ass 1 pt; sheep $\frac{1}{2}$ pt; dog 3 oz. *Locally* cooling astringent.

BARBADOS ALOE, purgative: Horse 4 drs; ass 3-4 drs; dog $\frac{1}{2}$ dr.

CAPE ALOE, purgative: Horse 5 drs; ass 4-5 drs.

ALUM, astringent: Horse 2-3 drs; ox 3-4 drs; ass 2 drs; sheep $\frac{1}{2}$ -1 dr; dog $\frac{1}{2}$ -1 scr.

AMMONIA, LIQUID, diffusible stimulant, antispasmodic, antacid, diuretic: Horse $\frac{1}{2}$ oz; ox $\frac{1}{2}$ -1 oz; ass 2-4 drs; sheep $\frac{1}{2}$ -1 dr; dog 10 drops. *Locally* blister.

AROMATIC AMMONIA, diffusible stimulant, antispasmodic, antacid, diuretic: Horse 1-2 oz; ox 2-4 oz; ass 1-2 oz; sheep $\frac{1}{2}$ -1 oz; dog 1 dr. *Locally* blister.

CARBONATE OF AMMONIA, diffusible stimulant, antispasmodic, antacid, diuretic: Horse 2-4 drs; ox 4-6 drs; ass 2 drs; sheep $\frac{1}{2}$ -1 dr; dog 10-15 grs. *Locally* blister.

MURIATE OF AMMONIA, stimulant, discutient, alterative, diuretic: Horse 2-4 drs; ox 4-6 drs; ass 2 drs; sheep $\frac{1}{2}$ -1 dr; dog 20 grs. *Locally* cooling discutient.

ACETATE OF AMMONIA, SOLUTION, diaphoretic, diuretic, stimulant: Horse 2-3 oz; ox 3-4 oz; ass 2 oz; sheep $\frac{1}{2}$ -1 oz; dog 2 dra.

ANISE-SEED, stomachic, carminative: Horse 1 oz; ox 1-2 oz; ass 1 oz; sheep 2-4 drs; dog 1-3 scr.

ANTIMONY, TARTARISED (TARTAR EMETIC), emetic: Swine 5 grs; dog 2-4 grs. Sedative, diaphoretic: Horse 2 drs; ox 2-4 drs; ass 3 drs; sheep 1-2 scr; swine $\frac{1}{2}$ -1 gr; dog $\frac{1}{2}$ - $\frac{1}{4}$ gr. *Locally* blister

ARBOA NUT, vermifuge, tennifuge : Horse 1 oz ; ox 1 oz ; ass 1 oz ; sheep 3 drs ; dog $\frac{1}{2}$ dr.

ARNICA TINCTURE, stimulant, diuretic : Horse 1 dr ; ox 1 dr ; ass $\frac{1}{2}$ dr ; sheep 1 scr ; dog 10 drops. *Locally* cooling, soothing.

ARSENIC, alterative, nerve tonic : Horse 5 grs ; ox 5-8 grs ; ass 3-5 grs ; sheep 1 gr ; swine $\frac{1}{2}$ gr ; dog 1-12 gr. *Locally* caustic, parasiticide.

ASAFOETIDA, diffusible stimulant, carminative, vermifuge : Horse 2 drs ; ox 4 drs ; ass 1-2 drs ; sheep $\frac{1}{2}$ -1 dr ; swine $\frac{1}{2}$ dr ; dog 10-20 grs.

AZEDARACH, vermifuge : Horse $\frac{1}{2}$ -1 oz ; ox 1 oz ; ass 3-4 drs ; sheep 1-2 drs ; swine 1 dr ; dog 20 grs.

BELLADONNA, anodyne, antispasmodic, narcotic : Horse 2 oz ; ox 2 oz ; ass 1-2 oz ; sheep $\frac{1}{2}$ oz ; dog 5 grs.

BELLADONNA, EXTRACT, anodyne, etc. : Horse 2 drs ; ox 2-3 drs ; ass 1-2 drs ; sheep $\frac{1}{2}$ dr ; dog 1-3 grs.

ATROPIA (alkaloid of Belladonna), anodyne, etc. : Horse 1-2 grs ; ox 1-2 grs ; ass 1 gr ; sheep $\frac{1}{2}$ gr ; dog 1-16 gr.

BALSAM OF PERU, stimulant, antispasmodic, expectorant : Horse 1 oz ; ox 1-1 $\frac{1}{2}$ oz ; ass $\frac{1}{2}$ -1 oz ; sheep 2 drs ; dog $\frac{1}{2}$ dr.

BENZOIN, stimulant, antispasmodic, expectorant : Horse 1 oz ; ox 1-1 $\frac{1}{2}$ oz ; ass $\frac{1}{2}$ -1 oz ; sheep 2 drs ; dog $\frac{1}{2}$ dr.

BORAX, nerve sedative, uterine stimulant : Horse 2-6 drs ; ox $\frac{1}{2}$ -1 oz ; ass 2-4 drs ; sheep $\frac{1}{2}$ -1 dr ; swine $\frac{1}{2}$ dr ; dog 5-10 grs. *Locally* astringent, parasiticide.

BISMUTH, SUBNITRATE, soothes irritation of the stomach and bowels : Horse 2 drs ; ox 2-4 drs ; ass 1-2 drs ; sheep 20 grs ; swine 10-20 grs ; dog 5-10 grs. *Locally* soothing, healing.

BLACKBERRY ROOT, astringent : Horse 2-4 drs ; ox $\frac{1}{2}$ oz ; ass 2 drs ; sheep 2 scr ; dog $\frac{1}{2}$ scr.

BLUE-STONE (copper sulphate).

BONESET, stimulant, tonic, diaphoretic : Horse $\frac{1}{2}$ -1 oz ; ox 1 oz ; ass $\frac{1}{2}$ oz ; sheep 2-3 drs ; swine 2 drs ; dog $\frac{1}{2}$ -1 dr.

BROMIDE OF POTASSIUM, nerve sedative : Horse 2-4 drs ; ox 4 drs ; ass 2-3 drs ; sheep $\frac{1}{2}$ dr ; dog 5-10 grs.

BUCHU, stimulant, diuretic : Horse 4 drs ; ox $\frac{1}{2}$ -1 oz ; ass 3 drs ; sheep 1 dr ; dog 10-20 grs.

BUCKTHORN SYRUP, purgative : dog $\frac{1}{2}$ -1 oz.

CALOMEL, purgative : Horse 1 dr ; ox 1-2 drs ; ass 1 dr ; swine 1 scr ; dog 3-4 grs. Alterative : Horse 1 scr ; ox 1-3 scr ; ass 1 scr ; swine 3-4 grs ; dog $\frac{1}{2}$ -1 gr.

CAMPHOR, calmative, antispasmodic : Horse 1-2 drs ; ox 2-4 drs ; ass 1 dr ; sheep 1 scr ; dog 3-10 grs.

CANTHARIDES, stimulant, diuretic : Horse 5 grs ; ox 5-10 grs ; ass 3-5 grs ; sheep 1-2 grs ; dog $\frac{1}{2}$ -1 gr. *Locally* blister.

CAPSIUM, CAYENNE PEPPER, stimulant, aromatic : Horse 2-3 drs ; ox 2-4 drs ; ass 1-2 drs ; sheep 1 scr ; swine $\frac{1}{2}$ -1 scr ; dog 2-5 grs. *Locally* irritant.

CARAWAY SEED, stomachic : Horse 1 oz ; ox 1-2 oz ; ass 1 oz ; sheep 2-3 drs ; swine 2 drs ; dog 1 scr.

CARDAMOM, stomachic : Horse 1 oz ; ox 1-2 oz ; ass 1 oz ; sheep 2-3 drs ; swine 2 drs ; dog 1 scr.

CASCARILLA, stimulant, bitter tonic : Horse $\frac{1}{2}$ -1 oz ; ox 1 oz ; ass 4-6 drs ; sheep 1 dr ; dog 10 grs.

CARBOLIC ACID, sedative anodyne, astringent, antiseptic, disinfectant : Horse $\frac{1}{2}$ -1 dr ; ox 1 dr ; ass $\frac{1}{2}$ dr ; sheep 10 drops ; dog 5 drops

CASTOR-OIL, purgative : Horse 1 pt ; ox 1-1½ pts ; ass 1 pt ; sheep 3-4 oz ; dog ½-1 oz.

CATECHU, astringent : Horse 2-5 drs ; ox 3-8 drs ; ass 2-3 drs ; sheep 1-2 drs ; dog 10-30 gra.

CHAMOMILE, stimulant, tonic : Horse 1 oz ; ox 1-2 oz ; ass 1 oz ; sheep 2 drs ; dog ½ dr.

CHERRY BARK, WILD, expectorant : Horse ½ oz ; sheep 2-3 scr ; swine 2 scr ; dog 1 scr.

CHLORAL-HYDRATE, sedative, antispasmodic : Horse ½ oz ; ass ¼-½ oz ; sheep 1 dr ; dog 20 gra. Soporific : Horse 1 oz ; sheep 2-3 drs ; dog ½ dr.

CHLOROFORM, stimulant : Horse 1-2 drs ; ass 1 dr ; sheep 1 scr ; dog 5-10 drops. Anæsthetic.

CINCHONA, PERUVIAN BARK, bitter tonic, antiseptic, antiperiodic : Horse 1-3 oz ; ass 1 oz ; sheep 2-4 drs ; dog 1 dr.

CINNAMON, stomachic : Horse 4-6 drs ; ox ½-1 oz ; ass 4-6 drs ; sheep 1-2 drs ; dog 10-20 gra.

COD-LIVER OIL, tonic : Horse 4-6 oz ; ox 6-8 oz ; ass 4-6 oz ; sheep 1-2 oz ; dog ½ oz.

COLCHICUM, diuretic, sedative : Horse ½-1 dr ; ox 1-2 drs ; ass ½ dr ; sheep ½ scr ; dog 2-8 gra.

COLOCYNTH, bitter purgative : dog 2-5 gra.

COLUMBO, bitter tonic : Horse 4-6 drs ; ox ½-1 oz ; ass 2-3 drs ; sheep ½-1 dr ; dog 10 gra.

CONIUM, EXTRACT, sedative : Horse 1 dr ; ox 1-2 drs ; ass ½-1 dr ; sheep 10-15 gra ; swine 10 gra ; dog 2-5 gra.

COPAIBA, stimulant, diuretic, expectorant : Horse 2-4 drs ; ox 3-4 drs ; ass 2-3 drs ; sheep ½-1 dr ; dog 10 drops.

COPPER, AMMONIATED, tonic, antispasmodic, astringent : Horse 1-2 drs ; ox 1-2 drs ; ass 1 dr ; sheep 10-20 gra ; dog 1-5 gra.

COPPER, IODIDE, tonic, discutient : Horse 1-2 drs.

COPPER, SULPHATE, tonic, astringent : Horse ½-1 dr ; ox 1-2 drs ; ass ½ dr ; sheep 10 gra ; dog 2-4 gra.

CROTON SEEDS, purgative : Horse 10-12 ; ox 15-20 ; ass 8-10 ; sheep 2-3 ; dog 1-2.

CROTON OIL, purgative : Horse 15-20 drops ; ox 20-30 drops ; ass 12-18 drops ; sheep 5-8 drops ; dog 3-4 drops.

CREAM OF TARTAR, diuretic : Horse 1 oz ; sheep 4-6 drs ; dog 1 dr. Laxative : Horse 5 oz ; ox 5-8 oz ; ass 5 oz ; sheep 1-2 oz ; dog ½ oz.

DANDELION EXTRACT, TARAXACUM, diuretic, laxative, bitter : Horse 1-1½ oz ; ox 2 oz ; ass 1 oz ; sheep 3 drs ; dog 1 dr.

DIGITALIS, sedative, diuretic : Horse 15-20 gra ; ox ½-1 dr ; ass 15 gra ; sheep 5-15 gra ; swine 2-10 gra ; dog 1-3 gra.

DOVER'S POWDER, sedative, diaphoretic : Horse 3 drs ; ox 3-4 drs ; ass 2 drs ; sheep 2 scr ; swine 1 scr ; dog 2-4 gra.

ENGOT, checks bleeding, parturient : Horse ½-1 oz ; ox 1 oz ; ass ½ oz ; sheep 1-2 drs ; dog ½ dr.

ETHER, diffusible stimulant : Horse 1-2 oz ; ox 2-3 oz ; ass 1 oz ; sheep ½ oz ; swine 2-4 drs ; dog 1 dr.

FENNEL SEED, stomachic : Horse 1 oz ; ox 1-2 oz ; ass 1 oz ; sheep 2-4 drs ; dog ½ dr.

FILIX MAS., EXTRACT, MALE SHIELD-FERN, vermifuge, tannic acid : Horse 1 oz ; sheep ½ dr ; dog 10-20 drops.

GALLA, OAK, astringent : Horse 4-6 drs ; ox 1-2 oz ; ass 4 drs ; sheep ½-1 scr ; swine 1-2 scr ; dog 1-3 gra.

GALLIC and TANNIC ACID, TANNIN, astringent : Horse 1-3 scr ; ass 1-2 scr ; dog 10-20 gra.

GENTIAN, bitter tonic : Horse 4 drs ; ox $\frac{1}{2}$ -1 oz ; ass 4 drs ; sheep 1-2 drs ; dog 10-20 gra.

GINGER, stimulant, stomachic : Horse 1 oz ; ox 2 oz ; ass $\frac{1}{2}$ -1 oz ; sheep 1-2 oz ; swine 2 drs ; dog 2 scr.

GLAUBER SALTS (SODA SULPHATE).

HENBANE, HYOSCYAMUS, EXTRACT, sedative, antispasmodic : Horse 2 drs ; ox 2-4 drs ; ass 1-2 drs ; sheep $\frac{1}{2}$ -1 dr ; swine $\frac{1}{2}$ dr ; dog 5 gra.

HEMP, INDIAN, EXTRACT, antispasmodic, soporific, narcotic : Horse $\frac{1}{2}$ -1 dr ; ass $\frac{1}{2}$ dr ; sheep 10-15 gra ; swine 5-10 gra ; dog 1-2 gra.

HYDROCYANIC ACID (PRUSSIC).

IODINE, alterative, discutient : Horse 10-20 gra ; ox 20-30 gra ; ass 10 gra, sheep 5-10 gra ; swine 5 gra ; dog 1-2 gra.

IODIDE OF POTASSIUM, alterative, diuretic : Horse $\frac{1}{2}$ -1 dr ; ox 1-2 drs ; ass $\frac{1}{2}$ dr ; sheep 3 scr ; swine 1-2 scr ; dog 1 scr.

IPECACUANHA, emetic, sedative : Swine 1-2 drs ; dog 15-20 gra. Diaphoretic, expectorant : Swine $\frac{1}{2}$ dr ; dog 3-5 gra.

JALAP, purgative : Swine 1-2 drs ; dog $\frac{1}{2}$ -1 dr.

IRON, PEROXIDE, tonic : Horse 2-4 drs ; ox 4 drs ; ass 2 drs ; sheep 1 dr ; dog 5-10 gra. Antidote to arsenic.

IRON, SULPHATE, tonic : Horse 2-4 drs ; ass 2 drs ; sheep 1 dr ; swine $\frac{1}{2}$ dr ; dog 2-5 gra.

IRON, CARBONATE, tonic : Horse 2-4 drs ; ass 2 drs ; sheep 1 dr ; swine $\frac{1}{2}$ dr ; dog 2-5 gra.

IRON, IODIDE, tonic, discutient : Horse $\frac{1}{2}$ -2 drs ; ox 1-2 drs ; ass $\frac{1}{2}$ -1 dr ; sheep 15-30 gra ; swine 10-20 gra ; dog 1-8 gra.

IRON, TINCTURE OF MURIATE, astringent, checks bleeding : Horse $\frac{1}{2}$ -1 oz ; ox 1-2 oz ; ass $\frac{1}{2}$ oz ; sheep $\frac{1}{2}$ -1 dr ; swine 10-30 drops ; dog 5-10 drops.

KINO, astringent : Horse $\frac{1}{2}$ oz ; ox $\frac{1}{2}$ -1 oz ; ass 2-4 drs ; sheep 1-2 lbs ; swine $\frac{1}{2}$ -1 dr ; dog 10 gra.

KOUSSO, vermifuge : Sheep 2-3 oz ; dog 1 oz.

LAUDANUM (OPIUM).

LEAD, ACETATE (SUGAR OF LEAD), astringent, sedative : Horse 1-2 scr ; ox 2-3 scr ; ass 1 scr ; sheep 10-15 gra ; dog 2-5 gra.

LIME-WATER, ANTACID, astringent : Horse 4-6 oz ; ox 4-8 oz ; ass 4 oz ; sheep 1 oz ; dog 1 dr.

LIME, CARBONATE, CHALK, antacid, astringent : Horse 1-2 oz ; ox 2-4 oz ; ass 1 oz ; sheep 2-4 drs ; dog 8-12 gra.

LIME, CHLORIDE, CHLORINATED, checks tympany, disinfectant : Horse 2-4 drs ; ass 2 drs ; sheep 1-2 drs.

LINSEED OIL, laxative : Horse 1-2 pts ; ox 1-2 qts ; ass 1 pt ; sheep $\frac{1}{2}$ pt.

LOBELIA, sedative, antispasmodic, expectorant : Horse 1-2 drs ; ox 1-3 drs ; ass 1 dr ; sheep 15 gra ; swine 5-15 gra ; dog 1-5 gra.

MAGNESIA, antacid, laxative, antidote to arsenic : Horse 1-2 oz ; ox 2-4 oz ; sheep 1 oz.

MAGNESIA, SULFATE, EPSOM SALTS, laxative : ox 1-2 lbs ; sheep 4-6 oz.

MALLOW, demulcent : Freely.

MENTHA PIPERITA (PEPPERMINT).

MERCURY WITH CHALK, HYDRARGYRUM CUM CRETA, antacid, laxative : Calf 10-15 gra ; dog 5-10 gra.

MERCURIAL PILL, BLUE PILL, laxative ; dog 5 gra.

MERCURY, SUBCHLORIDE (CALOMEL).

MURIATIC ACID, HYDROCHLORIC ACID, tonic, astringent, caustic, haemifectant: Horse 1 dr; ox 2 drs; ass 1 dr; sheep 20 drops; dog 2-5 drops.

MYRRH, stimulant, tonic: Horse 2-4 drs; ox 4-6 drs; ass 3 drs; sheep 1-2 drs; dog 15-20 gra.

NITRE (POTASSA NITRATE).

NITRIC ACID, tonic, astringent, caustic: Horse 1 dr; ox 2 drs; ass 1 dr; sheep 20 drops; dog 2-5 drops.

NUX VOMICA, nerve stimulant, tonic: Horse 10-30 gra; ox 20-40 gra; ass 10-20 gra; sheep 5-15 gra; dog 4-8 gra.

OAK BARK, astringent: Horse 1 oz; ox 2-4 oz; ass 1 oz; sheep 4 drs; swine 2-3 drs; dog 1-2 drs.

OLIVE OIL, laxative: Horse 1-2 pts; ox 2-3 pts; ass 1 pt; sheep 2-6 oz; dog 1-3 oz.

OPIUM, narcotic, sedative, anodyne, antispasmodic: Horse 1-2 drs; ox 2-4 drs; ass 1-1 dr; sheep 10-20 gra; dog 4-8 gra.

OPIUM, TINCTURE, LAUDANUM, narcotic, sedative, anodyne, antispasmodic: Horse 1-2 oz; ox 2 oz; ass 4-1 oz; sheep 2-3 drs; dog 15-30 drops.

MORPHIA, MURIATE, narcotic, sedative, anodyne, antispasmodic: Horse 2-5 gra; ox 5-10 gra; ass 3 gra; sheep 1-1 gr; dog 1-1 gr.

PEPPERMINT, OIL, stomachic, antispasmodic: Horse 20 drops; ox 20-30 drops; ass 20 drops; sheep 5-10 drops; swine 5 drops; dog 3-5 drops.

PERUVIAN BARK (CINCHONA).

PEPPER, BLACK, WHITE, stomachic, stimulant: Horse 2 drs; ox 3 drs; ass 2 drs; sheep 1-2 scr; dog 5-10 gra.

PIMENTO, stomachic, stimulant: Horse 2 drs; ox 3 drs; ass 2 drs; sheep 1-2 scr; dog 5-10 gra.

PODOPHYLLIN, purgative, sedative: Horse 1-2 drs; ox 2 drs; ass 1 dr; sheep 10-20 gra; swine 6-8 gra; dog 1-2 gra.

POMEGRANATE ROOT BARK, vermifuge: Horse 1 oz; ox 1-2 oz; ass 1 oz; sheep 2-3 drs; swine 1-2 drs; dog 20-30 gra.

POTASSA ACETATE, antacid, diuretic, diaphoretic: Horse 6-8 drs; ox 1 oz; ass 4-6 drs; sheep 1-2 drs; dog 10-20 gra.

POTASSA NITRATE, diuretic, febrifuge: Horse 6-8 drs; ox 1 oz; ass 4-6 drs; sheep 1-2 drs; dog 10-20 gra.

POTASSA BICARBONATE, antacid, diuretic: Horse 6-8 drs; ox 1 oz; ass 4-6 drs; sheep 1-2 drs; dog 10-20 gra.

POTASSA CHLORATE, stimulant, diuretic, refrigerant, antiseptic: H 1-4 drs; ass 1-2 drs; sheep 20-40 gra; dog 5-15 gra.

POTASSIUM IODIDE (IODINE).

POTASSIUM BROMIDE, nerve sedative: Horse 1 oz; ass 2-4 drs; sheep 2 drs; swine 1 dr; dog 20 gra.

POTASSIUM CYANIDE, sedative, antispasmodic: Horse 1-2 gra; ox 2 gra; ass 1-2 gra; sheep 1 gr; dog 1-1 gr.

PRUNUS VIRGINIANA (WILD CHERRY).

PRUSSIC ACID, sedative, antispasmodic: Horse 20-30 drops; ox 30-40 drops; ass 15-20 drops; sheep 5-8 drops; swine 5 drops; dog 1-3 drops.

PUMPKIN SEEDS, vermifuge, teniafuge: Dog 1 oz.

QUINIA, SULPHATE, bitter tonic: Horse 20 gra; ox 20-30 gra; ass 15-20 gra; sheep 6-10 gra; swine 5-10 gra; dog 2-6 gra.

RHUBARB, laxative, tonic: Horse 1 oz; ox 2 oz; ass 1 oz; sheep 1 dr; dog 20 gra.

RESIN, diuretic: Horse 4-6 drs; ox 1-1 oz; ass 4-6 drs; sheep 2-4 drs; swine 2 drs; dog 20-30 gra.

ACAF, diuretic, antacid, laxative: Horse 1-2 oz; ass 1 oz; sheep 2-4 drs; swine 2-4 drs; dog 20-60 gra.

SODA, DICARBONATE, antacid, diuretic: Horse 4-6 drs; ox 4-6 drs; ass 4 drs; sheep 1-2 drs; dog 5-30 gra.

SODA, SULPHITE, BISULPHITE, HYPOSULPHITE, antiseptic, disinfectant, alterative, relieves tympany: Horse 1 oz; ox 2-3 oz; ass 1 oz; sheep 2-4 drs; swine 2-4 drs; dog 20-60 gra.

SODA SULPHATE (GLAUBER SALTS), purgative: Horse 1-1½ lbs; ox 1-2 lbs; ass ½-1 lb; sheep 6 oz.

SONIUM, CHLORIDE (COMMON SALT), tonic, vermifuge, purgative: Horse 1-3 oz; ox 2-4 oz; ass 1 oz; sheep 2-4 drs; swine 1-3 drs; dog 10-30 gra.

SANTONIN, WORMSEED, SEMEN CONTRA, vermifuge: Horse ½-1 oz; ass 4 drs; sheep 2-4 drs; swine 1-3 drs; dog 10-60 gra.

SQUILL, diuretic, expectorant: Horse ½ dr; ox ½-1 dr; ass 20-30 gra; sheep 10-15 gra; dog 1-5 gra.

SILVER, NITRATE (LUNAR CAUSTIC), nerve tonic: Horse 5 gra; ox 5-8 gra; ass 2-4 gra; sheep 1-2 gra; dog ½-1 gr.

SPANISH FLIES (CANTHARIDES).

SPIGELIA, vermifuge: Horse ½-1 oz; ox 1-2 oz; ass ½-1 oz; sheep 2-4 drs; swine 2-3 drs; dog 1 dr.

STRYCHNIA, nerve tonic: Horse 1-2 gra; ox 1-3 gra; ass 1 gr; sheep ½-1 gr; swine ½ gr; dog 1-40 1-10 gr.

SULPHUR, expectorant, diaphoretic: Horse 3-4 oz; ox 5-6 oz; ass 3 oz; sheep 2 oz; swine 1½-2 oz; dog 2-8 drs. Laxative, alterative: Horse 1 oz; ox 1-2 oz; ass 1 oz; sheep 6 drs; swine 4-6 drs; dog ½-1 dr. Parasiticide.

SWEET SPIRITS OF NITRE, SPIRIT OF NITROUS ETHER, stimulant, antispasmodic, diuretic, diaphoretic: Horse 1-2 oz; ox ½-1 oz; ass 1 oz; sheep 2-6 drs; dog ½-2 drs.

STRAMONIUM, narcotic, sedative: Horse 20-30 gra; ox ½-1 dr; ass 15-30 gra; sheep 5-10 gra; swine 4-6 gra; dog 2 gra.

SULPHURIC ACID, tonic, refrigerant, caustic: Horse 1 dr; ox 2-4 drs; ass 1 dr; sheep ½ dr; swine 20 drops; dog 5-10 drops.

TOBACCO, sedative, antispasmodic, vermifuge: Horse 4 drs; ox 4-6 drs; ass 4 drs; sheep 1 dr; swine ½ dr; dog 5-6 gra.

TAR, expectorant, antiseptic: Horse ½-1 oz; ox ½-2 oz; sheep ½ oz.

TURPENTINE OIL, stimulant, antispasmodic, diuretic: Horse 1-2 oz; ox 1-1½ oz; ass ½ oz; sheep 1-2 drs; swine 1 dr; dog ½ dr. Vermifuge: Horse 2 oz; ox 2-3 oz; ass 1-2 oz; sheep 4 drs; swine 2-3 drs; dog 1-1 drs.

VALERIAN, diffusible stimulant, antispasmodic, vermifuge: Horse 2 oz, ox 2-4 oz; ass 2 oz; sheep ½ oz; swine 2-3 drs; dog 1-2 drs.

VALERIANATE OF IRON, nerve tonic: Dog 4-5 drs.

VERATRUM, sedative: Horse 1 scr; ox ½-1 dr; ass ½-1 scr; sheep 5-10 gra; swine 5-8 gra; dog 2 gra.

WILD CHERRY BARK, expectorant: Horse 1 oz; ox 1½ oz; ass 1 oz; sheep 3 drs; dog 30 gra.

ZINC CARBONATE, astringent, tonic: Horse 2 drs; ox 2-4 drs; ass 2 drs; sheep ½-1 dr; swine ½ dr; dog 10-15 gra.

ZINC, SULPHATE, astringent, tonic: Horse 1-2 drs; ox 2-3 drs; ass 1 dr; sheep 15-30 gra; swine 10-20 gra; dog 2-3 gra. Emetic: Swine 15 gra to 1 dr; dog 5-15 gra.

BLISTERING, ETC.

As an example of a simple blister for the horse, the following may be given :

Powdered Cantharides	-	-	2 drs.
Camphor	-	-	5 grs.
Oil of Lavender	-	-	10 drops.
Lard	-	-	1 oz.

Mix thoroughly. When applying it, first cut the hair from the part, then rub the ointment well in with the palm of the hand and against the direction of the hair, for four or five minutes. The animal should be tied short to a high rack or otherwise prevented from reaching the blistered surface with his lips until it is well raised. Then the application may be washed off with soap suds and the part smeared daily with lard. The blister should not be repeated until the effects of the first have passed off.

For cattle, $\frac{1}{2}$ oz. oil of turpentine or 10 grs. tartar emetic may be added to the above blister. For pigs, cantharides and turpentine may be used alone, 1 of the former to 4 of the latter. For dogs and sheep, equal parts of strong aqua ammonia and olive oil may be used and rubbed in as often as may seem requisite.





A FAMILY PARTY.

EDUCATION AND TRAINING OF THE HORSE

BY
Prof. A. H. ROCKWELL.*

CHAPTER XXI.

Prejudice against "horse trainers." This system of educating horses original. Tried and found to be valuable. Rockwell Bridle. To make the horse follow you. To add style. To teach him to lie down. To sit up. To say no. To bow, and kiss you.

In treating upon this subject we are well aware of the difficulties under which we labor. We are conscious of the fact, that we are quite apt to excite the prejudices of men who, having managed horses to a considerable extent, and having ways of their own with which they are satisfied, are likely to cry "humbug" to any idea which to them is new and strange. We are also aware that there already exists in the minds of many intelligent persons a settled opposition to all professionals whose business is pretending to improve the Horse—an opposition arising from the many failures among that class, and the consequent damage done to their animals by being handled by such men or under their instructions. We have no reason to expect

*Prof. Rockwell, the originator of the best system of horse-training yet tried, was drowned while on a professional visit to British Columbia; the public will therefore never again have an opportunity of attending his private schools for learning his valuable secrets for educating the horse. For a few lessons, Mr. Rockwell charged his pupils from \$5 to \$10, and exacted a promise from them never to teach others. Previous to his death he wrote out his system of Horse Education, and we are now able, for the first time, to give it to the public (with all its secrets and mysteries, for which he charged \$10) free with each copy of the "*The Canadian Farmer's Veterinary Adviser*."

that we can obliterate these prejudices entirely; but we have faith to believe that if we are given a careful hearing, and our advice put into practice, we shall do much to improve the opinions of the people upon the subject of the "*Education of the Horse*." We do not expect to improve their opinion of "*Horse-Taming*." It may be of some service, but, in common with thousands of others, we fail to see it. The distinction between *taming* and *educating* is clear and positive, and can not be gainsayed by even the most careless observer. We think we have made this sufficiently clear, but desire to impress the point, as it is on account of the "*Horse-Tamers*" that the existing prejudices have mainly arisen.

We have devoted our lives to the investigation and study of this subject, and whether our efforts have been of any value to the public or not, we are certain of having had a very extensive *experience* with horses. We do not by any means claim to be infallible, but we speak of this to satisfy the public that ours is no system picked up in a day, but that *it is the result of incessant labor for years*. Of one thing we can assure the public, that, whether the ideas we advance are original with ourselves, or whether they are ideas of others adapted to our system, neither are recommended without first having been put thoroughly to the test by *actual personal experience*. We advise no plan which we have not successfully tried, and found to be valuable.

There is a certain moral responsibility resting upon the author of works of this nature, which is embarrassing to a high degree. The rules which he sets forth are sometimes deviated from without the knowledge of the operator himself—either from his not clearly understanding the meaning, or from his having too loosely scanned the printed instructions—and the desired result is not reached. This leads to a distrust of the system. Occasionally, too, circumstances may arise in the handling of the horse which no foresight could have provided against, and if the operator does not find in the book a remedy for his difficulty he lays it aside in disgust. Nevertheless we submit our work, confident of being able to be of some public service.

In the *education of the pleasure-horse* there are many points of value to which allusion might be made, which the limits of this work will not permit. We shall, however, touch upon those of the most importance in every-day use. Bear in mind that, to make the lessons which we are about to give effectual, it will be necessary to give one or two lessons each day, for a few days, until the habit of obedience is confirmed. Before proceeding

with our lessons we will give a detailed description of one of the most important implements used in training the horse.

THE ROCKWELL BRIDLE AND HOW TO MAKE IT.—This consists of a common check joint-bit, with rings at each end, but no bars; the shorter the bit is the better. Put one of the rings of the bit in a vice, and press it flat-wise until a ring of the same size will slip over and on the bit. Slip two iron, steel, or composition rings of about the same size on the bit; turn the flattened ring half around, put it again in the vice, and restore it to its round form. This forms a bit with two rings loose upon the mouth-piece. Attach the bit to a common bridle in the usual manner. As you place the bit in the mouth of the horse, have the loose rings one on each side of the mouth. Fasten a strap to one of the loose rings, bring it over across the nose just above the nostril, and fasten it to the other loose ring, drawing it moderately tight. Attach a strap to the brow-band, bring it down the centre of the face, and attach it to the straps over the nose in such a manner as to prevent its slipping down. Take a piece of stout cotton clothes-line rope, about eight feet in length; tie one end to near-side ring of the bit, pass the other end under the jaw, through the off-side ring of the bit; then bring the rope over to the near-side from the off-side to the near-side, placing it about where the collar usually comes; pass it down the near-side, and pass it through over that portion of the rope which is between the two bit-rings under the jaw. Now, as you tighten upon the rope you will perceive that the tendency of the two rings which are attached to the strap over the nose and play loosely upon the bit, is toward the centre or joint of the bit, and that they will consequently press tightly upon the cheek. The sensation which this pressure occasions you may illustrate by pressing inwardly upon your own cheeks with your mouth partially opened. The effect upon a horse is instantaneous and irresistible. We have spent years of careful study in endeavouring by experiment to ascertain the best method of governing a horse's mouth without injury to the animal. This method is the result of our patient labors. It cannot injure a horse, and it is a safe and reliable controlling power.

TO CAUSE THE HORSE TO FOLLOW YOU.—To cause him to follow you while his head is confined with a bridle or halter, put on the "Rockwell Bridle," take hold about two feet from the head, give him a few short quick side pulls to

the right and left, then taking quickly hold of the rope farther toward the end, as you step back say decidedly, "Come here sir!" If he comes forward, caress him; if he does not come, give him a pull with a sideways tendency, and repeat the attempt to have him come forward, until he does come; then start off either to the right or left, with the rope slackened; if he does not follow you, give him more pulls sideways and try him again. With an ordinary horse, you can teach the lesson in ten minutes, so as to be followed by him when you are near the head. Step partially behind him, lay the rope along his back, and say, "Come here sir!" He will not be likely to do it, because he has only been taught to go *forward* at the words. To teach him to follow you in this direction, you will then chirrup to start him, repeating the words. If he comes, caress him; if he does not come, or moves in the wrong direction, pull upon the "Bridle" caressing him as he obeys. The same rule will apply to any direction in which you wish him to follow you. It is quite necessary to teach the horse this habit, as it is the foundation of many others, and is one of the most valuable which the horse can possess.

To teach him, for your amusement, to follow you when entirely loose, put on the near fore-foot the long foot-strap, and place on him a girth; pass the strap under the girth, and, holding the end in your hand, step away from him; then step toward him, and if he attempts to step away from you, pull up on the strap and say, "Whoa!" If he stops, step up and caress him; repeat until he will allow you to step up to him without moving away. Now take a short blunt whip in your right hand, and the strap in your left, standing by his side; pass your right arm over the withers and gently touch him on the off-side of the head; if he starts to move off, pull on the strap and say, "Whoa!" When he turns his head, caress him, gradually with the whip forcing him to turn his head around toward you; when he will do this every time you put the whip over, you may remove the foot-strap, and practice him in the lesson until he will come to you every time you lay the whip across his neck; then put on the foot-strap again, put your whip in the same position, and hit him in the same place quite hard, at the same time saying, "Come here, sir!" After a little he will be very prompt; then place him in a corner and step off at a distance of eight or ten feet and say, "Come here, sir!" If he comes caress him; if he does not come, hit him gently on the breast with a long whip; he will perhaps struggle to get away, and if he attempts

to get out of the corner, pull upon the strap. When he faces you, step up to him and caress him, placing him back in the corner, and repeat; if he finally shows a disposition to follow, step back coaxingly, and when he stops, caress him; at each further repetition use the words, "Come here, sir!" at each motion of the whip; in this way he will soon learn to follow you at the word, if you have a whip in your hand. Don't take him out of doors to practice until he is quite perfect, and then beginning in small yards and alone.

HOW TO ADD STYLE TO THE HORSE.—Take a common three-strand cotton rope, manufactured of as fine material as you can procure, about three-eighths of an inch in diameter, very strong, and about ten feet in length. Tie a knot at each end—an ordinary hard knot with the end passed through the tie *twice* instead of once is proper—slipping it down close to the end. A knot thus tied will not untie; a *single* tie is in danger of slipping out. About the middle of the rope tie a common bow-knot, not drawing it tight, however; pass the opposite end through the loop of the bow-knot, barely passing the knot at the end of the rope through the bow; then pull the bow out as you would to untie it, drawing the rope through the place occupied by the bow, and then draw the knot tight. You will thereby form a loop at one end of the rope, of the proper size to go over a horse's neck. Standing by the near-side of the horse, near the neck, take the large loop in both hands, pass it over the head and well down on to the neck, the same as a collar is put on. This loop should be of a size to fit the neck closely, when in that position. Pass the end from front to back through between the rope and the neck; then place the running loop thus made in the mouth, back of the bridle-teeth, and draw upon the rope. This will cause the rope to slide through the mouth. Now step in front of him with the rope in your right hand; give him a gentle pull, raising your hand; you will observe that this is a powerful and effectual means of checking up the horse. By a repetition of this for a few times he will become accustomed to raising his head gracefully at each gentle pull upon the halter, and through the control you have acquired over his mouth. When you pull up on the lines to drive him, he remembers his lesson, and will need no check-rein to exhibit style in the head and neck.

If he is inclined to put out his nose, pull down on the bridle, caressing him as he yields freely to the pull; then put on the

martingales, having them rather short, and drive him thus for a number of weeks. After the habit of curving the neck is formed, then apply the rope, and teach him to hold his head and neck up by the upward pull, leaving off the martingales. You can as well have a *showy horse* as an awkward one.

HOW TO MAKE THE HORSE LIE DOWN.—Take a short foot-strap, standing on the near-side with your right hand throw it over the back, and with your left hand bring it under and tie it to the near fore-foot; tie a knot in the bridle-rein on the back of the neck; with your right hand, pulling over the back, pull up the near fore-foot under him just back of the forelegs; with your left hand hold firmly upon the bridle rein near the head; if he attempts to jump, pull him around towards you a few times. He will soon cease his efforts to escape, when you will ease up and caress him, never letting loose, however, while he is struggling to get away; pull upon the strap as before, and with your left hand pull upon the bridle rein near the knot on the neck so as to turn his head from you; then gently but firmly bear down on his back with your right hand until he comes down upon his knees; shift the left hand so as to pull his head toward you, and crowding against him, hold him firmly until he lies down, causing him to lie down from you; pull his head well up toward you and step over him; pass the end of the foot-strap which is in your right hand through the ring of the bridle-bit, and pull the head up and over, and hold it. He cannot get up while in this position. Hold him thus a short time, and pulling the strap out of the bridle-bit, and stepping away say, "Get up!" and crack a whip or chirrup. This process does not injure the knees, and after a few times repeated he will lie down readily; then pull up the foot with the strap as before, and whip him across the knees until he kneels and lies down. Practice with this will accustom him to lie down at the motion of the whip.

HOW TO EDUCATE THE HORSE TO SIT UP.—When the horse is lying down, as in the previous illustration, take a long foot-strap, and passing the centre of it over his neck, bring the end between his fore-legs, and pulling him flat on his side, fetch his hind-legs well up under him, and tie them with the end of the foot-strap, then saying "Sit up!" as he attempts to rise, use all your strength in pushing back on the bridle. He will come into a sitting posture. This repeated sufficiently often will teach him to sit up in the same manner, without the use of the strap, at the word of command.

HOW TO MAKE A HORSE SAY NO.—Stand by your horse near the shoulder, holding a pin in your hand, with which prick him lightly on the withers, and to drive away which he will shake his head. Then caress him, and repeat until he will shake his head at the motion of your hand toward his withers.

HOW TO TEACH A HORSE TO BOW AND KISS YOU.—Stand as before, and with a pin in your fingers prick him lightly in the breast, as if a fly was biting him. He will bring down his head to relieve himself of the supposed bite. You will caress him and repeat. If he looks or acts cross, scold him. He will soon nod each time you put your hand toward his breast. Now place an apple, or some dainty for the horse, upon your cheek, and holding it toward him, say, "Kiss me." He will take the apple from your face. Repeated, he will put forth his mouth when you turn your cheek toward him and say, "Kiss me." You may, when the lessons are perfect, say to the horse, "Will you kiss me?" and cause him to bow; then turning your cheek and saying, "Kiss me!" he will kiss you.



PROF. ROCKWELL'S SYSTEM OF BREAKING UP BAD HABITS AND VICES OF THE HORSE.

CHAPTER XXII

The mouth the controlling influence. The "bridle" a powerful influence. The overdraw check. To break a horse from kicking while harnessing, grooming or shoeing. Balking. Pulling at halter. Bridle pulling. Bad to back.

Having already made sufficient allusions to explain our theory and practice, with the reasons therefor, we proceed to our lessons upon the habits of the horse. In these there is frequently use for the "Rockwell Bridle," and as it would occupy too much space at each allusion thereto to give the manner of its use, we refer the reader to the explanations under its proper heading.

We here take occasion to allude to a fact in connection with the use of this "Bridle," which if properly understood and appreciated will be valuable to the operator. The seat of the main means for exercising a controlling influence over the horse is the *mouth*. Get a *governable mouth*, and your mastery over the animal is more than half accomplished. All horses with bad habits have bad mouths, and you must give a practical force to the theory that it is the mouth to which you are to apply your governing forces, before you have succeeded in gaining a right to ask the horse to obey your will. Having governed, we may then proceed to teach, but not till then. Remember that for every habit there must be a separate application, and while this "Bridle" (which is so effective in controlling the mouth) is used in only one way, there are *as many different meanings* to be attached to its use as there are different habits to be cured, or lessons to be taught. Its use, therefore, prepares the mouth and head for the common bridle to carry into effect what is so well begun, and to give practice until the bad habit is broken up or the desired new one rendered permanent. The "Bridle," to accomplish so much good, must of course be a powerful instrument, and *caution* must be observed not to use it to such an excess as to excite the animal to anger. The overdraw check is another implement which we find very serviceable in connection with breaking up the bad habits of the horse.

THE OVERDRAW CHECK AND HOW TO MAKE IT.—Many horses are addicted to the habit of carrying a low head, tossing the head up and down, curving the neck so as to interfere with breathing while travelling rapidly, etc., for remedying which there are many resorts; but the readiest and most handy one to accomplish the most general results, is what we denominate the "*Overdraw Check*." As it is somewhat difficult to describe the manufacture of this check, we will commence by suggesting that you put a common check-bit in the horse's mouth, tie a string to the near-side ring, pass it up over the face between the ears, and let it hang down on the off-side of the neck to the place where the gag-runner should come; tie a similar string to the ring on the off-side of the bit, and bring it in the same manner over the head and down the near-side. You will thereby get the proper length, and by attaching the strings together at the point where they cross the face, you will have the measure to the place where the straps of the check are to join from the bit. Take the measure from the horse which is to wear it. Take a strap about an inch wide, the length of the strings, allowing for a buckle and loop; slit the leather up as far as the point where the strings crossed, leave a half inch, then slit the leather the rest of its length. Attach a buckle to each of the shorter ends, and form a gag-runner on each of the longer ends, rounding the leathers. Buckle your shorter ends to your check-bit. Take your head-stall, and an inch each way from the centre on the top of the head place a loop: put a bit in the mouth, and pass the longer ends of the "*Overdraw Check*" through the loops on top of the head-stall; then attach an ordinary check-rein with buckles on both sides, to the check-bit, and pass it through the gag-runners on the end of the "*Overdraw Check*" (instead of those usually belonging to the head-stall); just before the point where the check-reins join the check-hook, fasten the check-rein together with a rivet, so that when hooked on, it cannot slip back and forth through the check-hook. Care should be exercised to have the check-rein properly tightened. This will have a tendency to throw the nose out, giving the horse breath and a graceful carriage. The driving-lines must be attached to an easy bit, additional to the check-bit.

TO BREAK A HORSE FROM KICKING IN SINGLE HARNESS.—Take the "*Rockwell Bridle*," and give him a few *strong lively pulls* to fix his attention upon your movements. Handle him

sufficiently in this manner to cause him to follow you, back, stop, stand, etc., as per previous instructions; in other words, exercise him until you gain perfect submission, and get a good control of the mouth. Having this accomplished, you may harness him, and place upon him one of "*Rockwell's Safety Lines*," which is made as follows:—Take a common blind bridle, with a double ring-bit, instead of the ordinary bit. Attach to the loose rings the "Overdraw Check," the round portion of the check-rein to pass through the gag-runners of the "Overdraw," the flat portion which usually belongs in the check-hook to be only about a foot in length, so that the check-rein will lie upon the curve of the neck; the loop which is made on the check-rein of the "Overdraw," by rivetting the flat strap together at the centre, to be one inch from the centre to the off-side. To this loop attach a common driving-line; pass it through the bridle-bit from the outside, and pass them up through the gag-runners (if the gag-runners are not quite strong, supply their place by fastening a strap about one foot long, with a ring in each end, to the head-stall, over the head); then pass them through the terrets with the reins, and thence through a ring fastened on the back-strap just back of the hips, fastened strongly and so that it will not slip forward, seeing that the croup and back-strap are strong; now hitch him to a dray or job-waggon, and tie the ends of the rope firmly to the thills, pulling it snug enough to check the head up as high as he can conveniently carry it and travel. Take up the lines and drive him carefully the first few times. The habit being now probably broken up, you must practice him until he is safe, and he will then be ready to hitch up to a light carriage.

KICKERS IN DOUBLE HARNESS.—The best method for double kickers is to use the "safety-line" as described with single kickers. Another plan is to use the same means to gain submission which are described in alluding to kickers in single harness. Then put on a harness, and add to your common head-stall the "overdraw check." Instead of passing the driving-lines through the martingales, pass them through the "overdraw" gag-runners, and thence through the terrets. Have a strap attached to the bit, and have a person go ahead of the horse about ten feet, with the strap loose, until the horse attempts to turn, when he will pull up on him. You take the lines which pass through the "overdraw" gag-runners, and, standing behind the horse, start him up; then jerk upon the

lines, saying, "Whoa!" and stop him; then, saying "Get up!" you will start him again, and repeat the jerk and the stopping. This is to be done with considerable energy and activity, urging him with a whip if he refuses to go, and repeating until the horse will stop and start at the word of command without the use of the lines. Two or three lessons will probably be sufficient, when you will place him alongside his mate in double harness. Take a small rope, about twenty-five or thirty feet in length, fasten the centre of the rope to the head-stall, on top of the head, between the "overdraw check," which should be already on; pass the ends down through the "overdraw" bit, back through the gag-runners of the "overdraw;" pass them through the terrets, and then through a large stout ring which is fastened to a strap that should go under the tail, in addition and similar to the crouper, the ring to be tied down to the back-strap; pass the ends down and tie them to the ends of his single whiffletree. In this position he may be driven and worked with perfect safety, and after a few attempts at kicking he will so far abandon it as to be under the control of the common driving lines. Be careful and not tease or annoy a kicking horse. Gentleness and quiet treatment, accompanied with a sure control, will always effect a cure.

Another plan, which we have formerly advised, and which has proved quite successful, is to put on a strong strap halter, with a pulley or ring in the head of the halter-stale; pass it over a girth and under the body; pass your hands quietly upon the hips and down the hind-legs, and buckle a strap with a ring on around each; tie a rope or strap to the rings, passing it through the pulley or ring at the end of the halter-stale. Then let up on the bridle and start him along. He will probably kick and flounce considerably, when you must hold him firmly. As soon as he becomes quiet, caress him, and speak to him gently. Lead him along, and you will find, after a few attempts, that he will become reconciled to the gearing, when you may take it off. Keep cool yourself, and show determination by your acts; for if you hesitate or show doubt, the horse will be sure to know it, and your labor will be materially increased. Repeat the next day, and you will find him very much improved. During this process, as well as all other efforts to break up bad habits, where the horse is to be severely exercised, keep him in good feed, and give him the best of care. If you break a horse of habits when he is in low feed and has but little ambition, they may develop themselves afterward when he is in high feed and fine spirits.

There are other methods of accomplishing the same ends which we have used, but those we mention we consider the best. Among those we have discarded is one of putting a strap around the neck, and attaching the strap from the hind legs to that, instead of a halter. We are informed that some person is lately pretending to have a patent upon this plan; but we used it years ago, until we had learned better modes.

KICKERS WHILE HARNESSING.—Put on a "Rockwell Bridle," and give him a few sharp pulls, and, standing by his shoulder, draw it up *very* tight, tying it with a half-hitch. Under all circumstances keep hold of the end of the "bridle" when it is thus tied, to be enabled at any moment to pull out the tie if occasion requires. In this position you need not fear his kicking. Put on the harness quietly, being particular in handling that portion of the harness in the rear very gently. Few people understand *why* a horse kicks while being harnessed. The reason is simply this: he first kicked from being hurt by the harness being thrown too heavily upon him, or from some other injury or careless movement. Upon kicking he has probably been struck with a pitchfork or some other handy weapon. The horse, as far as he has any idea on the subject, gets the idea that you strike him because he does not kick hard enough, and he tries to satisfy you by kicking with all his might. With a motion of our whip we can make our horse *Tiger* kick without fail, because we have taught him this. It is teaching the same thing to the horse when you strike him, and he soon *learns his lesson* so well that he will kick at the motion of taking up the harness. He has learned to associate the harness with injury to himself, and he supposes kicking is what you want; consequently, the harder you strike the harder he will kick. To teach him a *different lesson*, you must place him in a position where he cannot kick, and proceed to handle him gently. Now ease up on the rope and caress him. If he is so bad that the feeling of the harness then induces him to kick, before he can do so, if possible, pull up sharply upon the "Bridle." A few quick pulls will divert his attention to his mouth, and he will begin to find that nothing hurts him in the rear, and he will stop trying to kick. Loosen upon the rope and lead him around; perhaps half an hour may be necessary before he becomes perfectly reconciled; then remove the harness. Put on the "Bridle" *every time* you harness or unharness him for the first few days. You will perceive a manifest improvement by this

time, and you may now give practice to the lesson by putting on the head-stall first when harnessing, hooking the check-rein into the check-hook before putting on the harness; then, if he shows signs of kicking, you will gently pull on the check, which, reminding him of the "Rockwell Bridle," will cause him to hold up his head and forget his other troubles; as you gently put the harness on the back and proceed to buckle the crouper, you have the same control by means of the back-strap. Keep this up until you are satisfied of there being no farther need of this precaution, being watchful in putting him into the thills so that he is not hit hard or unnecessarily excited. Have him very carefully groomed and handled. A horse that is not a very bad kicker will probably be broke with much less trouble than we have alluded to—the lesson we give in this, as well as other cases, being adapted to the *worst* ones.

TO BREAK A HORSE FROM KICKING WHILE GROOMING.—A patient and careful man is best calculated to cause a change of this habit. The horse with this habit is always afflicted with too much nervousness, augmented frequently by heedless handling. Put on the "Rockwell Bridle," and treat him the same as the "kickers while harnessing," drawing it up tight and tying. Then take a currycomb and commence currying him upon the neck, gradually approaching the places where he is tender, when you will very softly and gently pass the currycomb over the places. He will not be able to kick, and will stand tolerably still. After two or three times currying, you may proceed without the "Bridle" being drawn up tight, but as you approach the tender places give him a slight pull, having the end of the rope held in your hand for that purpose, and each time he cringes or shows signs of kicking, pull up sufficiently to attract his attention to the head, and curry with a lighter hand. Convincing him that he is not to be hurt soon allays his nervous fears, and he will yield to your control. If the habit is just being formed, apparently pay no attention to the horse's movements, but be *sure* that your currycomb does not *hurt* him.

TO CURE A HORSE FROM KICKING AND STRIKING WHILE SHOEING.—The blacksmith should always use every precaution necessary to protect his life while shoeing strange horses, and if there are any signs of viciousness, should at once take steps for his own protection, proceeding according to instruc-

tions in the following lesson, as far as his judgment warns him is necessary. The rules we give are to apply to the worst and most vicious animals. Take hold of the halter-stale within a foot or two of the head; with your left hand pull his head toward you on the near-side, and, by a rapid motion with your right, catch firmly hold of the tail, and instantly commence whirling him around, pulling the head toward you. Whirl him three or four times around and stop, stepping quickly up to the head; before he has had time to get over his confusion and dizziness, repeat the whirling operation, and while he is still laboring under the effects of the whirl, strap up his near fore-leg; put on the "Rockwell Bridle," and step out in front of him. There is no danger now of him striking you. Use him sharply with the "Bridle," pulling earnestly and vigorously to and fro, and leading him around on three legs, until you are confident that you have completely discouraged him. See that the cord is well down on the neck, and draw up tightly on the rope and tie with a half-hitch. Never keep the head tied down in this manner more than two or three minutes at a time. If you are not through, loosen up and tie again. Take a hammer and strike a few times upon the foot which is strapped up, at the same time handling it. When he grows quiet let down the foot and take up the off fore-foot, by throwing the webbing over the neck, tying it, and drawing up; then hammer that foot in the same manner until he allows you to hold it without trying to get away, then let it down. This will do for horses which strike while being shod forward, provided the "bridle" is kept drawn tight. For kickers, an additional precaution is required. Take the "short foot-strap," tie it around the near hind leg, about six inches above the fetlock (where the blacksmith usually takes hold of the leg), with a slip-noose knot. Take a short hold with the left hand upon the "bridle," loosen it, and, with the right hand upon the foot-strap, pull him around two or three times. Have some other person hold him now by the head, and step back and pull upon the foot-strap, backward, sideways, etc. In an experience, during our travels, with thousands of vicious horses, we found but three horses which the above plan did not bring to perfect submission. These were brought to terms by taking the "long foot-strap," tying it around the neck with a slip-noose knot (placing it well down on the neck), passing it between the fore-legs, bringing it around the near hind-leg just above the hock, and passing it through the portion around the neck. This prevents the rope

tightening around the neck, and gives you a means of holding the hind-leg which will prove perfectly convincing to the horse that he is over-matched. Pull up on the hind-leg with one hand and on the "Rockwell Bridle" with the other. If time is important, you will find it advisable to shoe him while thus held, which can be done with a little inconvenience, changing the strap as you change legs. Every time you do this without hurting him goes to help cure him, which cannot, however, be done in less than five or six days. These same rules will apply to mules, though mules are controlled easier.

KICKING ON ATTEMPTS TO ENTER STALL.—Use a stout halter. Take the "Rockwell Bridle," placed on as usual, except that the rope should, in this case, be tied on the *off*-side ring of the bit and passed through the *near*-side ring, and without being thrown over the neck. Lead him into as wide a stall as convenient, tie the halter-stale rather long, and as you come out draw slightly upon the rope of the "Rockwell Bridle," bringing the end out with you, and hanging it in some handy place. When you have occasion to enter or go near the stall, take hold of the end of the rope, and if the horse kicks and squeals, pull upon the rope, being careful not to pull too hard. This will have the effect to make him stop kicking. In a short time he will have learned that to kick is to be brought up by the rope, and he will cease altogether. After having pulled and entered the stall, remember and caress him, impressing upon him that he is not to be hurt by your entrance. You will thus not only teach him better manners, but win his confidence. Never strike or shout at a horse while you are entering the stall.

BALKING IN DOUBLE HARNESS.—Apply the "Rockwell Bridle" frequently for about two days, using it vigorously. After the first day put the rope up over the top of his head. In pulling him to and fro you need not be very gentle; on the contrary, be severe, after each side-pull pulling him straight ahead, impressing upon him that he *must* move along whenever anything presses upon the head and mouth. He must be kept in ignorance of his ability to resist after you once commence breaking him of the habit. Start with him, and when half through neglect him, and let him balk again, and you lose nearly all the ground gained. You must therefore be sure that you *can* do what you try, and be certain that you *do* accomplish every movement which you undertake. Now, if the horse shows signs of being angry or

on the "Rockwell Bridle" with the rope. Tie a knot in the end of the tail; part the hairs above the knot, and pass the rope of the "Rockwell Bridle" through the opening, pulling it up until it draws the head pretty well around, and tie it with a half-hitch. Then with a whip start him around, and as he whirls hit him first over the face with your hand, then with the whip around the legs, until he has whirled about three times around, then catch hold of the end of the rope and untie it. Do not let him whirl too much, or he will become so dizzy as to fall. This is a powerful controlling influence of itself, and in our hands has frequently been sufficient of itself to break balky horses. Now, take hold of the bridle and lead him along. This will suffice for this lesson, repeating it, however, frequently each day for three or four days. He is then ready to hitch up in harness. Place the balky horse on the off-side (if on the near side, of course reverse the whole operation). Take a soft, stout half-inch rope, about six feet in length; tie a small loop, just large enough to slip on the under jaw at one end of the rope; put the loop on the horse's jaw (regardless of his tongue); pass the rope up the off-side of the neck, close to his ears, over and down the near side, through the loop on the jaw. Tie a strap from the hame-ring on one horse to the hame-ring on the other. Take a stiff, stout pole, and eight or ten inches from one end tie it firmly to the inside end of the true horse's single-tree; lay it across the strap running from hame to hame; tie a strap from the true horse's shoulder to the pole, so that the pole cannot get more than halfway over to the balky horse; have the pole project a little beyond the horse's mouth, and tie the rope to the end of the pole, leaving only just sufficient slack on the rope to allow the horse to travel without interference from it while in his place. You will see that as you now attempt to drive, if the horse balks, the true horse will, in pulling his single-tree forward, pull with the end of the pole upon the rope, and remind the balky one that he *must* move; the strap from the shoulder of the near horse to the pole will prevent a side draft, and the eighteen inches projecting over at the rear end will, as the true horse pulls up, slide along the double-tree, and keep the weight of the pole from pressing the single-tree down. A few times practising with this will remove all desire to balk. You may work the team with this pole on, never overloading.

Another good way to start a balker is to tie a stout strap to the inside hind-leg of the balky horse; bring it over the pole of the waggon, and tie it, moderately tightened, to the true horse's

collar. As the true horse starts up, and the balky one lags back, the pull upon the leg attracts his attention, and in his struggle to release himself he forgets to balk, and will move forward.

BALKING IN SINGLE HARNESS.—Treat him the same as you treat the kicker in double harness up to the point where you get the horse ready to harness. Put on a single harness and let him stand in the stall with it on an hour or two, and then take it off, repeating when convenient. On the second day, having the harness on, buckle it up rather tight; tie the traces into the breeching-rings, drawing them up pretty snugly. This will accustom him to the pressure of the harness, toughening him to bear it, as well as if the pressure was caused by pulling a load. He should stand thus for an hour or two, then take off the harness. Between the times of his wearing the harness have him wear the colt's biting bridle, pretty well checked up. Don't be afraid of biting the balky horse too much, nor of handling him too much with the "Rockwell Bridle," provided you do not get the mouth sore. If it gets sore, wait for it to heal. Now put on the harness, buckled up tightly, and the traces tied in with the Bridle, bit and rope attached to the blind bridle, instead of the ordinary bit, the rope lying over the neck; then take the reins and drive him around, twisting and turning in all directions. If he attempts to balk, throw the reins across the back, and exercise him with the "Rockwell Bridle," and renew the attempt to drive. Do this as long as there are any symptoms of balking. Keep the horse well fed during all the efforts to break him. Now hitch him up to a light waggon, having the harness very loose and loosely checking him; handle the reins very gently, and drive him slowly and without exciting him, giving him every advantage to go. If he only shows signs of balking, pay no attention to him; but if he does balk, take him out of the waggon, and taking hold of the rope of the "Rockwell Bridle," make him feel it severely; then put him back in the waggon, and start him along gently. If, in holding him up, he attempts to prance, make him go along at a rapid gait (under all circumstances, when colts or young horses attempt to prance or wish to rush ahead, we always let them go, and they soon find their level). If you wish to match or drive him double, mate with a spirited horse.

If your horse is a lazy, sleepy balker, he wants treating very differently. Treat him as before, up to the point where you are ready to harness. Instead of harnessing him, we take him when he is in the stall sleeping, lying, or standing, and with a very

loud, sharp word or yell, hit him one severe blow with the whip. Do not repeat this until you find him when he is entirely unaware of your presence, when you may do it again—doing it as often as opportunities of this sort offer—and whether in or out of harness, surprise and startle him in this way often. This apparently unnatural mode of proceeding may be easily explained. The horse of this kind is not excitable, and balks because his nervous system does not stimulate him to action. By frightening him in the manner spoken of, you soon arouse his nervous sensibilities, and whenever he is spoken to sharply and a blow accompanies the word, he is quite certain to move with alacrity. The object in not repeating the word and blow is, that the second one might anger him, which is not what you want, as that would make him worse, it being impossible to cause him to obey you when he is maddened by blows. *Never strike a horse while he is balking!* and never load a balky horse heavy. If you cannot afford to give him light loads, trade him off to some one who can.

RUNNING AWAY.—IN DOUBLE HARNESS.—Use the "Rockwell Bridle" as in the case of kickers, except that in pulling upon it, after pulling sideways, you pull *backward* each time. Give three or four lessons. If you choose, give them all in one day, though the longer you continue it the better. The next day hitch him up double, using, instead of the ordinary bit, the double-ring bit, belonging to the "Rockwell Bridle," attaching the "overdraw check" to the *loose* rings of the bit and the reins to the outer rings, with the long "foot-strap" on. When you start him out of the yard, after he has gone a few steps, pull him up suddenly and say, "Whoa!" pulling on the foot-strap; drive him on a little ways, and pull him up in the same way, saying "Whoa!" as if you yourself were frightened; drive him up to objects which alarm him, or cause noises to be made which excite him, pulling him up, fetching him well back to the waggon. You need not pull up the foot-strap every time. It is used in this case more for a protection than to teach. The teaching is to be mainly done through the mouth. He cannot run if the strap is pulled up; so you are safe if you are watchful. You may, however, frequently put him on a run and stop him by the foot-strap, pulling him back. The "Bridle" should be applied for two or three months, at intervals. You may take off the foot-strap after you are satisfied it is safe to do so, though you had better not drive a bad runaway until by means of these sudden stoppings he has become well accustomed to being stopped, and readily yields to

the pull and the word. Every few weeks it is well to try the foot-strap and use some means to cause him to try and run, being sure always to pull up before he can run, to test the force of the lesson.

IN SINGLE HARNESS.—We advise that the runaway in single harness should, if convenient, be hitched up double, and apply the remedy for runners in double harness for two or three times, the "Rockwell Lidle" being applied before hitching up at all. Put on the single harness, using "Rockwell's Safety Lines." Drive with the usual driving-lines held in the left hand and the safety-line held in the right hand, and if the horse attempts to run pull upon the "safety-line." This will effectually stop him, and eventually cure him. While you are on your guard you may excite him to run, and then stop him. You will in this, as well as in many other lessons, avoid a bad reputation for your horse by practicing after nightfall or within your own premises.

If your horse runs away *but once*, immediately apply the remedy. It is sinful to risk the lives of those who are to ride after him. A little time and labor is of no account in comparison with the damage he may do, and a horse which has run once, no matter from what cause, is likely to run again, and the remedy should be applied to prevent it. The plan of tying a strap to each hind-leg above the gambrel, passing it through the girth, was taught by us for years, with tolerable success; but we have abandoned it for the ones we describe, as we have found them to be far preferable. We are informed that a patent has been taken out for this tying plan; but the patent is void from lack of originality, and, in view of the later improvements by us, is comparatively valueless.

TO TEACH THE HORSE TO STAND TO CARRIAGE.—Proceed the same as when teaching the colt to stand to be harnessed, using the common bridle if it will answer, if not, apply the "Rockwell Bridle." Lead him on to the floor, place him in the position you wish him, and say "Whoa!" The object of this lesson being to teach him the application of the word "whoa"—the most important word in horsemanship—you will proceed by stepping away from him, and if he moves, put him back and repeat, "Whoa!" If he appears to trifle and not heed you, use the "Bridle," pulling upon him to warn him to attend to you. Practice this until he will allow you to walk away in any direction without moving himself. Take a whip and crack it slightly,

and if, at this, he moves, put him back as before, increasing the cracks of the whip until you accustom him to stand while the whip is being flourished. If you are obliged to drive him while you are trying to break him, do not use the word "whoa," as he is not yet accustomed to minding it, and it will only make matters worse. Shift the position of the horse and repeat the lesson, putting on the harness and leading to places where he is accustomed to refuse to stand, and teach him to stand in those places, as well as teaching him to obey the word "whoa," before hitching him to carriage. Then hitch him to a carriage inside a building, with the doors closed. Get in and out of the carriage, rattle the thills and shake the carriage, causing him to stand by means heretofore alluded to. If it appears that the habit is caused by fear of the carriage behind him, take him out of the thills and lead him around it, allowing him to examine it, and even eat oats out of the measure set in the carriage. Now take him out of doors, and if he renews his attempts to start, take him out of the thills and use the "Rockwell Bridle," fetching him back between the thills, and say, "Whoa!" You will by this means soon teach him that "whoa" means for him to *stop* and *stand*. Repeated, he will stand quietly until you are ready to give him the signal to start. For the sake of not undoing all you have done, remember the caution heretofore given, to say "whoa" only when you mean him to stop.

TO CURE THE HORSE FROM PULLING AT HALTER.—Place on him a common halter head-stall. Put on a common girth. Take a half-inch rope about twenty feet long. Pass the centre of this rope under the tail in place of the cronper; twist the rope over a couple of times; pass the ends of the rope under the girth, bringing an end up on each side of the neck, and pass the ends through the nose-piece of the head-stall, under the check-pieces, and tie to a stout ring or place, leaving about three feet play of rope. As soon as the horse pulls back, he being tied by the tail to the ring, he pulls upon the tail, and the hurt coming there instead of the head, where he expected it, he starts up, it being natural to go *from* the hurt. Another plan may be found—in fact, any plan which brings the pull in the rear, either upon the tail or the leg, will do the business. Your ingenuity will devise several ways to accomplish this; but we consider tying to the tail the safest, as there is no danger attached to it; and if he is in the habit of pulling nights, this arrangement may be left on without fear of the horse getting tangled in the rope, as there

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would be if tied to the leg. Common-sense will show you that as there is no pull upon the head, and consequently no hurt there, he will soon cease pulling and lose the habit. To make the lessons effective, you may cause him to pull by using such exciting means as are apt to alarm him.

A rougher and not quite as effectual a way is to place a pulley down through the rack and feed-box, pulling it through the ring or place of tying about four feet, and tie to the halter. At the other end of the rope, which lies on the floor overhead, tie a fifty-pound weight. When the horse pulls back, the weight lifts, and as he tires of pulling and yields, it draws him back into the stall. These rules followed up will cure.

BRIDLE-PULLING.—Put a rope on the tail in the same manner as in halter-pulling, except that you pass the ends through the rings of a bridle, and tie them to a post where the horse is in the habit of pulling, unhitching the waggon if one was attached. Step away, and frighten him by means of a wheelbarrow or whatever is apt to alarm him, causing him to pull. As he pulls, the pressure coming upon the tail, he will step up to the post. Take hold of the rope between the post and his head, and give it a few pulls back and forth. By this means he will learn to step forward rather than pull back. After a few lessons he may be tied with a common tie-strap, the end, however, passing through the ring of the bridle-bit, and being tied to the back-stap. Do this until you are satisfied you have effected a cure.

TO MAKE A HORSE BACK.—Use the "Rockwell Bridle," and then tie him to a ring in a wall or building with a long halter-stale. Lead him past the ring as far as the length of the halter will allow, and from the opposite side from the halter pull back upon the Bridle, not using at this time any words. Continue this until he backs readily at the pull, then begin using the word "*back*" and repeat until he understands the meaning of the word, and will back upon being told to. Do this next in harness, and, if necessary, after he is hitched to a waggon. There is no difficulty in soon fixing the lesson upon his attention so that he will never forget it.

A plan which we once used was to use a rope in somewhat the same manner as the "Rockwell Bridle," except that instead of the double-ring bit we had a small loop on the end of the rope, which slipped on the under jaw. This cord was used by us for a while as we now use the "Rockwell Bridle," but we found it to injure

the mouth, and in fact we killed one horse in Salem, Mass., by its use, and have since discarded it, finding by experience that the bridle of our invention is perfectly harmless and more effectual. With the cord alluded to we would pull backward upon the horse, at the same time lifting up his foot with the "foot-strap."

The two worst horses we have ever met with in our travels were broken to back by these means. The first one was at Brighton, near Boston, Mass., in the spring of 1863. This horse was a large stout animal, which for nine years had not been known to back, and all efforts to teach him had failed. If put into a stall too narrow for him to turn round in, they were compelled to hitch another horse to him and draw him out. We broke this horse in twenty-five minutes, so that he would readily back at the word, and he never has forgotten it. We broke *him* by means of the cord in the mouth, and the "foot-strap," but not without blistering his mouth badly, and marking it for life.

The other horse alluded to was broken at Cleavland, Ohio, in February, 1874. In this case we used the "Rockwell Bridle," and a halter attached to a ring in a wall (one of the best places for the lesson to be given). This was done before one of our private classes in that city, and the animal was so notoriously bad that not one of the two hundred spectators present had faith that he could be made to back; but he *did* back, and without being in any way injured, within fifteen minutes from the time he was brought before the class, and the lesson was so effectual as to operate permanently upon the animal.



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